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COMMUNICATIONS

OCULAR CYSTICERCUS CELLULOSAE*

Report of a case of parasite in vitreous

BY

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THIS case is considered worthy of being put on record because of the rarity of the condition, and more especially because of the ophthalmoscopic picture presented, a picture which was indeed remarkable. Moreover the entoptic observations herein recorded must be unique.

On August 9, 1944, while working in a British General Hospital in Italy, caring for Jugo-Slavs, I was asked to see a patient in one of the surgical wards who was complaining of defective vision in his right eye. A quick examination revealed a peculiar cystic mass in the lower vitreous, and for proper examination the patient was taken to the ophthalmic department. On first examination in the dark room the condition was not diagnosed definitely—there was a large brilliantly coloured globular cyst in the vitreous, and once or twice I got a glimpse of what seemed like a little tail projecting below—something quite new to me. The patient was returned to the ward with diagnosis of (?) parasite in vitreous. Later that same day it suddenly occurred to me—could this cyst not be the cystic stage of a tape worm and the " tail " the scolex? and straightway I went to the ward. To my astonishment I found that this was indeed so; by careful examination through

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the considerable vitreous haze, the head, neck and tiny segments could be made out.

The following day the patient was again examined in the ophthalmic department, when a complete history was obtained and drawings made of the appearance presented.

History.—In 1938, while chopping sticks, was struck by splinter on the right eye. Eye was inflamed for 3-4 days, then cleared up leaving vision unaffected. In April, 1944, had typhus fever and was desperately ill. Gangrene of both legs developed, necessitating double amputation. (Jugo-Slav Hospital.) Nothing of importance was made out from his personal history. Before the war he had worked in a barrel factory.

On April 16, he was admitted to the British Hospital with flexion deformity at both knee joints. On June 10, he first noticed a fog in front of his right eye—a uniform grey haze—and this remained unchanged until July 26, when a well-defined object " shaped like a pear-leaf " became superimposed. Further, this " pear-leaf " had a " stem " attached and this " stem " was constantly changing its position. The patient was quite an intelligent individual and described well, of his own accord, just exactly what he saw. He spoke of the " leaf " as having a well-defined clear centre surrounded by a grey zone (" like a spider's web ") and then a dark band at the periphery. The " stem " was of a uniform dark grey colour with a knob at the end shaped " like a serpent's head." Usually the " stem " projected upwards—sometimes it swayed to the right, but more often to the left. Sometimes it folded itself along the periphery of the " leaf " or it seemed to go in front of or behind the " leaf." Of special note was his statement that the " stem " sometimes retracted into the " leaf," the head only projecting, the remainder swelling into a mass like an " electric bulb." At no time was there complete withdrawal of the " stem." He stated quite definitely that since first noticed the " pear-leaf " had not increased in size—neither had the " stem." The " pear-leaf " was quite stationary in the field of vision moving only with the eyeball. The patient kindly consented to reproduce on paper the appearances of the " leaf " with its " stem " in various positions. Result (untouched) as in diagrams.

Examination.—Right vision = 5/60. Left vision = 6/6. Nil abnormal noted in left eye. Right eye—white, deep linear central corneal scar with several adherent spots of iris pigment (perforating injury 1938). After homatropine and cocaine :—Pupil dilated and circular—ring of iris pigment on anterior lens capsule. No " K.P." Two cuneiform opacities above, otherwise lens clear. There was considerable vitreous haze with many dense freely moving opacities. The upper fundus and optic disc were fairly well seen

and could be passed as normal. In the lower vitreous there was a highly lustrous, almost completely spherical cyst. The colouring was indeed remarkable—the brilliant blue-green above passing to a russet-brown at the centre shading off to a lemon tint below. The upper periphery was surounded by a narrow brilliant golden halo. (The colouring astonished me as much as the first time I looked at a cat's fundus.) Careful focusing failed to reveal any structure within the cyst. It was estimated that the cyst was about 8 mms. in diameter and situated near the equator of the eye. At the lower margin was the miniature tape-worm constantly changing its position in a low swaying movement. Sometimes it disappeared completely behind the cyst—sometimes only the head appeared round the edge and then gradually its whole length appeared. Two pigmented marks on the head were reckoned to be suckers, while still more anteriorly from a little depression, tiny nipple-like structures were protruded and retracted. I am unable to say what these tiny nipple-like structures were. I thought at first they might be hooklets, but hooklets are too small to be seen with the ophthalmoscope. Whatever they were, only one at a time was seen to be protruded. Apart from the general undulating movement of the scolex, the head itself possessed powers of movement, swaying around in a circular fashion as if feeling its way about.

At the extreme periphery of the fundus, extending from "3 - 4 o'clock" there was a large irregular yellowish area—like acute choroiditis. Careful and repeated examinations were made but no retinal detachment was made out. Tension was normal in either eye. Drawings were made getting the relative size of the optic disc, vesicle and scolex and coloured as accurately as possible. From these drawings the artist has been able to produce a picture of the parasite which is considered to be an accurate representation of the ophthalmoscopic picture.

A thorough general examination was made but no palpable cysts could be found. Nor could any calcified or calcifying cysts be seen by X-ray. X-ray report on skull was: "There are spotty rarefactions in the skull which are more like Schüller Christian's disease than anything else." Repeated examination of stools revealed ova of ascaris lumbricoides and oxyurias vermicularis, but no segments of taenia. Blood examination showed no increase in eosinophils. Casoni test was negative.

At this stage several interesting points might be noted. 1. The fog in front of his eye denoting the entrance into the vitreous of exudates from the inflamed choroid; 2. The sudden appearance of the "pear-leaf" with "stem" denoting the bursting through of the parasite from the subretinal tissues; 3. The verification of entoptic imagery by ophthalmoscopic appearances. Interesting

from an optical point of view was the statement that since the pupil had been dilated with atropine, the "pear-leaf" and "stem" were both reduced to half their previous size.

Owing to exigencies of war time the patient was liable to be transferred from hospital at a few hours' notice, so operation was decided upon for August 12.

Operation.—Surface cocaine and novutox 3 per cent. into Tenon's capsule. With the same technique as I have used for posterior route magnet extractions, the sclera was exposed (in this instance) between the inferior and internal recti muscles, a traction suture inserted into insertion of inferior rectus, and the eye gently rotated upwards, the patient being instructed to keep looking up all the time. Unfortunately diathermy was not available and cautery was used to make a ring of points on the sclera near the margin of the inferior rectus and at a safe distance from the limbus. Two scleral sutures were inserted and the sclera incised between them for a distance of 7 mms. Gentle traction was then put on the scleral sutures so as to expose the choroid which was incised along the length of the scleral incision. As was expected, there was considerable loss of fluid vitreous and this loss was aggravated by the patient's behaviour. In spite of this, a fine scleral hook was introduced into the vitreous and after several attempts the cyst finally appeared at the lips of the wound. It was immediately transferred to warm saline. Scleral sutures were tied and the conjunctival flap replaced. Both eyes were bandaged. It had been hoped that introduction of a scleral hook into vitreous could be watched with the ophthalmoscope, but due to vitreous loss and corneal haze, this was impossible.

Post-operative notes.—On the day following operation the eye was slightly injected with a fairly large hyphaema. Two days later the hyphaema had almost disappeared, but the next day patient complained of some pain in the eye and a large hyphaema was present again. It was impossible to keep the patient still in bed. This may or may not have been a contributing factor in causing the haemorrhage. One week later the eye was almost white, but still a small hyphaema and blood clot could be seen in vitreous. On October 3 (day of discharge) the eye was white. Vision = hand movements at 1 metre. Soft eye. Much blood clot in vitreous. Light projection good.

Cyst removed from vitreous.—The cyst was examined with a corneal loupe. It was seen to be a smooth oval white body about 5-6 mms. in diameter. Careful search was made for the scolex, but none could be found and it was believed that it had got broken off in the process of extraction. It was noted that in the centre of the cyst was a dense white spot (see photo) but the significance of this "milk spot" was not realised. Later it was demonstrated

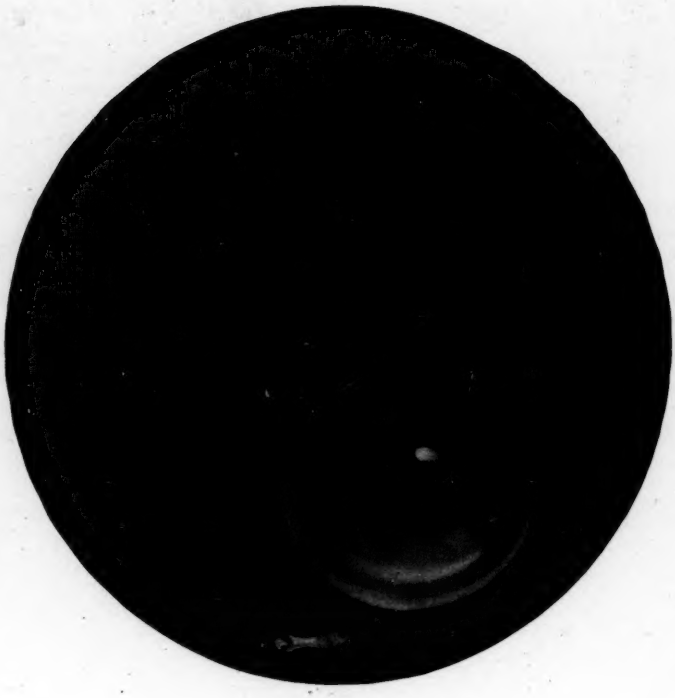

FIG. 2.

Cysticercus in vitreous.

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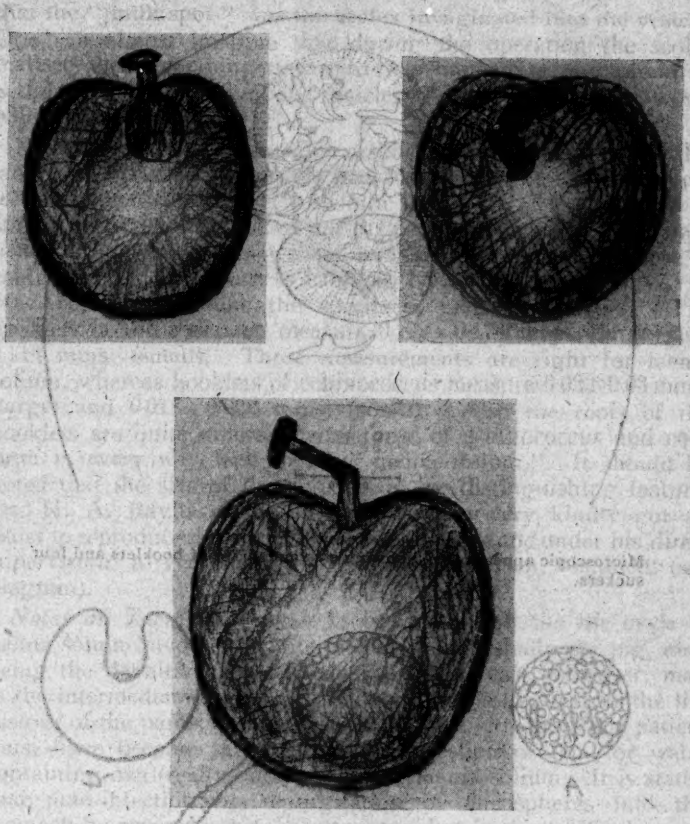

FIG. 1.

Entoptic observations showing various positions of scolex. (Drawn by patient).

FIG. 3.

Photograph of cysticercus in normal saline—scale in mms. Note "milk spot," the invaginated scolex.

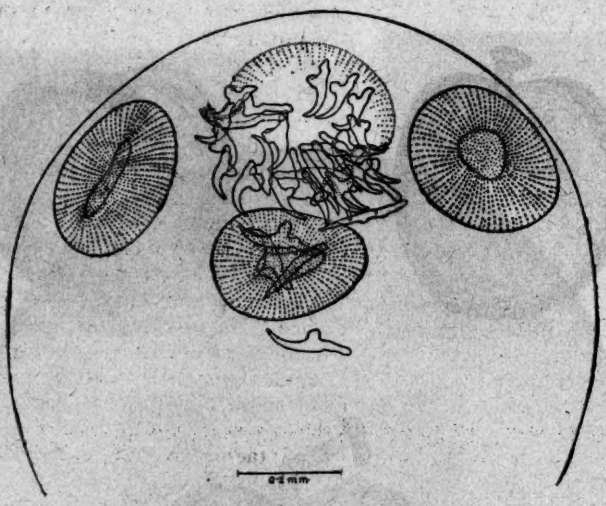

FIG. 4.

Microscopic appearances, showing size and shape of hooklets and four suckers.

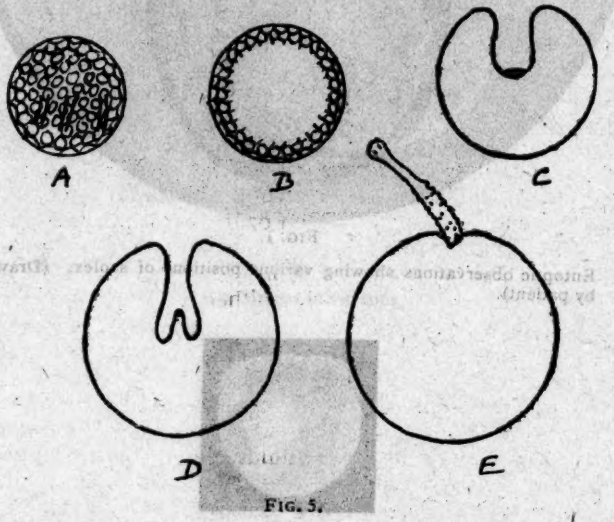

FIG. 5.

Diagram showing development of cysticercus (after Belding). (*a*) Oncosphere with hooklets. (*b*) Cavity formed by liquefaction of central cells. (*c*) Invagination of bladder wall with scolex developing at base. (*d*) Further stage of development of scolex. (*e*) Scolex evaginated.

that the " milk spot " was the scolex invaginated into the vesicle. One can almost imagine that during the operation the scolex realised that something untoward was happening and promptly withdrew to the safety of the vesicle. Truly " the smallest worm will turn when trod on " !

Next the cyst was mounted on a slide and examined with the slit-lamp, but no structural details could be made out. Unfortunately it was not possible to get a definite diagnosis of the parasite in Italy. Hooklets were found but their identity could not be established although from their shape they were thought to be those of echinococcus. On return to England I was able to get Sir W. P. MacArthur to examine the specimen, and he reports: " The hooklets of the specimen measure 0·172 - 0·174 mms. (large) and 0·114 mms. (small). Those measurements are right for taenia solium, whereas hooklets of echinococcus measure 0·022-0·03 mms. (large) and 0·018 - 0·022 mms. (small). Also the roots of the hooklets are quite different from those of echinococcus and conform in every way with those of taenia solium." It should be noted that the size of the hooklets is the distinguishing feature. Dr. H. A. Baylis of the British Museum very kindly got an artist to reproduce the microscopic appearances and under his direct supervision a very accurate picture has been obtained (see diagram).

Notes on Taenia Solium.—As is well known the life cycle of taenia solium involves an intermediate host, usually the pig, man being the definitive host. In this particular case, however, man is the intermediate host, and it is worth while to consider the life history of the parasite until its arrival in the vitreous. The patient must have become infected by the ingestion of food or water containing ova (really oncospheres) of taenia solium. It is stated that auto-infection by regurgitation of oncospheres into the stomach by reverse peristalsis can ocur, but in this particular case infection by adult taenia solium was definitely not present. In the intestine the oncosphere or hexacinth embryo with its six hooklets penetrated the intestinal wall and either by way of lymphatics or portal vessels eventually found its way into the systemic circulation and so up to the ophthalmic artery and thence along posterior ciliary artery (probably long) to lodge in the choroid. In the choroidal tissues the oncosphere loses its hooklets and the central cells liquefy, forming a spherical body with a peripheral lining of active cells surrounding a collection of fluid. Subsequently there is an invagination of bladder wall at one point and at the base of this invagination a scolex is formed (see diagram). Normally in soft tissues a firm fibrous capsule surrounds the cysticercus, but in the choroid no such capsule can be produced and thus we find the parasite able to burst through into the vitreous chamber. It

is difficult to explain why there wasn't a retinal detachment—one would have expected it with such a relatively large cyst in the subretinal tissues. If the oncosphere had lodged in a branch of the retinal artery, earlier entrance of the parasite into the vitreous would have occurred. Moreover, the extensive area of choroidal involvement points to a primary lodgement in the choroid.

Notes on the Literature.—No attempt will be made to give a comprehensive review of the literature on ocular cysticercus cellulosae. This has been done by Duke-Elder (Text-Book of Ophthalmology, Vol. III). But here some relevant points will be noted and some of the recorded cases studied in more detail.

The frequency of cysticercus infection depends on the habits and hygiene of the people concerned. Thus in war time when hygienic conditions are poor we find a corresponding increase in the infection—noted after the First Great War in Germany and Rumania (Elschnig and Michail). A similar increase may be expected now, remembering the appalling conditions under which so many peoples in Europe have lived during the Second Great War. Cysticerci, of course, may develop in any tissue or organ of the body—order of frequency, according to Belching being subcutaneous tissues, brain, eye, muscles, heart, liver, lung and peritoneum. But it is highly probable that its frequency in the eye is only apparent, for there the parasite definitely makes its presence felt. In England indigenous cysticercus infection is rare, but MacArthur has pointed out its occurrence in British soldiers returned from overseas service and emphasizes its importance in the aetiology of epilepsy—a fact which should be known to all ophthalmologists.

In 1865 Teale described a case of cysticercus in the vitreous—"About the centre of the posterior surface of the lens there is a brilliant white spot which is prolonged backwards into the vitreous by a dull grey neck which then rapidly swells out into a balloon-shaped body." It was thought to be harmless from its fixity in the "vitreous canal" and no attempt was made to remove it.

In 1886 Leber described his method of removal of cysticercus from the vitreous by scleral section and reports 11 successful cases out of 14. In 1897 Griffith describing two cases writes: "In each case one saw with the ophthalmoscope a large spherical bluish-white cyst, and springing from this the neck of the animal like an alabaster pillar, surrounded by the head and suckers, which, with its slow regular and graceful movements, reminded one of an elephant's trunk—the whole appearance presenting a picture once seen never to be forgotten"—certainly a very graphic description. In 1925 Elschnig described a case which closely resembles my own. Important points are: 1. The cyst with scolex was freely movable in the vitreous changing its position from

day to day. 2. A strip of sclera 10 mms. long by 3mms. wide was hinged backwards so as to get adequate access to the vitreous. 3. Two attempts by "suction spoon" (Barraquer) and one by forceps were made but failed to extract the parasite. A third attempt by Barraquer's sucker was successful. During these manipulations the parasite was kept under observation by ophthalmoscope with considerable difficulty due to corneal haze and partial collapse of the globe. 4. Parasite was kept alive for five days in blood serum. 5. Visual acuity was reduced from 6/36 to light perception due to extensive vitreous haemorrhages.

In 1935 Michaïl described 12 cases including the remarkable case where the vesicle was in the vitreous and the head in the suprachoroid and neck surrounded with scar tissue. Michaïl thinks this scar tissue might have eventually strangulated the parasite. In 1935 Bruck advocates Krönlein's operation for removal of cyst from posterior segment of the eye and describes three cases where subretinal cysts were removed by that technique.

Discussion

First, was the attempt to remove parasite from the vitreous justified and what was the prognosis if left alone? It is believed that in the course of a few months death of the parasite would have occurred. Indeed just how it derived nourishment within the globe is a problem. Further, the dead parasite acts as a strong irritant and leads to complete disorganisation of the eye. There are numerous cases in the literature of this happening (Michaïl and Griffith). MacArthur 1933 writes—"Cysticerci while alive usually enjoy a relative tolerance on the part of the host, but after death they act as strong irritants."

Next anaesthesia. Local anaesthesia was found to be quite inadequate, but I was unfortunate with my patient. Indeed it was impossible to get blood from a vein for W.R., so "agonising" was the needle prick.

The question of Krönlein's operation being the method of choice was considered. But in view of the fact that the patient had large prominent eyes and the cyst was near the equator, it was considered that adequate access could be gained by rotation of eye upwards. But it is agreed that for cysticercus far back in the globe and in a deep set eye, Krönlein's operation would be necessary.

The chief difficulty in the operation is loss of fluid vitreous with partial collapse of the globe and consequent corneal haze. It is difficult to see how such loss can be prevented. In theory, at any rate, it might be a good scheme to trephine the sclera (2 mms.) and introduce a hook or sucker with exactly the same diameter. Vitreous would thereby be prevented from escaping and the parasite watched with ophthalmoscope. Once the parasite was

brought to the sclera, lateral incisions could be made to enlarge the opening and so allow extraction, and previously inserted scleral sutures could be tied at once to minimise vitreous loss. The difficulty is vitreous loss *before* the parasite can be grasped, and by some such scheme as above this might be prevented.

The latest report May 1, 1945 : Right eye white. Vision = good light perception. Tension normal. Projection doubtful from above.

Acknowledgment.—I wish to thank Colonel Rees, Officer Commanding British Military Hospital, and Lieut.-Col. B. W. Rycroft, Adviser in Ophthalmology, C.M.F., for permission to publish this case, and Sir. W. P. MacArthur and Dr. H. A. Baylis for identifying the specimen and giving me help in the preparation of this paper.

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TANGENTIAL DISPLACEMENT OF THE IRIS IN CHRONIC GLAUCOMA*†

BY

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GLASGOW

THE advanced atrophy of the iris stroma which is seen in patients suffering from chronic glaucoma of long standing is well known to all ophthalmologists. The condition with which this paper is concerned may be the early stage of this atrophy but it can be found in the early stages of the disease. In certain cases the normal radial arrangement of the iris stroma is replaced by a distribution running at a tangent to the pupillary margin. This change may involve a considerable segment, or even the whole iris. When the condition is well marked the pupil appears to have rotated around its own axis.

* A paper read at the Oxford Ophthalmological Congress, July, 1945. † Received for publication, July 14, 1945.

This change in the appearance of the iris pattern has been familiar to me for a number of years, but it does not appear to be widely known that it may be seen in the early stages. Thus the sign has a practical value and should be kept in our minds during routine clinical work. It is this practical point which I wish to stress rather than speculation upon the underlying mechanism. The sign may be present in quite early stages of the disease, but I have not seen this mentioned in the books frequently used by students and practitioners. As far as my observations have gone the appearance is only present in its permanent form in primary

FIG. 1.

FIG. 2A.

FIG. 2B.

glaucoma. My impression is that the condition is no more frequent in patients who have used miotics for a long time than in those who have had no such treatment.

The condition is shown diagrammatically in Fig. 1 in which the upper half indicates the normal radial arrangement and the lower half shows the tangential displacement. I have made several attempts to make photographs and considerable technical difficulties were encountered. A few of these were overcome by stereoscopic photographs, but in general the results were not very successful. In Fig. 2A a segment of a normal iris is shown above and that of a patient showing the alteration in iris pattern in Fig. 2B.

In order to form an opinion regarding the incidence of this sign thirty-five patients with chronic glaucoma were examined consecutively for its presence or absence. The record was made prior to

operation in most cases. Those with only one eye were not included. The mean age of the patients was 62.1 years and there was no age difference between the sexes. There were seventeen men and eighteen women. The appearance was present in fourteen (five men and nine women) and was absent in twenty-one (twelve men and nine women) of the series of thirty-five. In two men and two women it was present in both eyes.

The information contributed by the seventy eyes of the thirty-five patients was arranged in the manner shown in Fig. 3. On the basis of visual acuity the material was divided into three groups;

VISION

IRIS	6/12 and better	6/18 to 6/60	6/60 and worse	
Tangential	6	4	8	18
Normal	25	11	16	52
	31	15	24	70

FIG. 3.

those with recorded visual acuity of 6/12 or better, those between 6/18 and 6/60 inclusive and those with less than 6/60. This does not show any association between the presence or absence of tangential displacement and the condition of the patient, as judged by the visual acuity.

Among the six patients who showed iris pattern changes with good central vision, five had tension within normal limits, four had no cupping of the disc and three had no field defect. In only one patient was the evidence limited to the iris pattern change alone and she had well marked glaucoma in her other eye. In three of the patients the appearance of the iris provided corroborative evidence of real clinical value.

On the other hand when the ten patients were considered in whom the change was present in one eye but not in the other a tendency appeared for the iris pattern displacement to be associated with reduced acuity when the dividing line was 6/18 and better. The distribution is shown in Fig. 4 and I would accept these figures as being significant. That is to say that there is an association between change in iris pattern and poor central vision, although a few show the change only in the eye with the better acuity.

	VISION		
IRIS	>6/18	<6/24	
Tangential	3	7	10
Normal	8	2	10
	11	9	20

FIG. 4.

I have made no attempt to elaborate the matter by constructing tables showing the relationship to length of history, type of operation, visual fields or tonometer readings. Such would have tended to obscure my main point which is that a tangential displacement of the iris pattern may occur in chronic glaucoma in an eye which has good central vision and may be the better eye of the two. This sign may occur early in the disease and its presence is not confined to the advanced stages. This irregularity in appearance makes it the more necessary for us to be on the look-out. In fact this paper arose from my asserting that a patient was suffering from glaucoma on the visual evidence of one engorged anterior perforating ciliary vessel and tangential displacement of the pattern in one sector of the iris in one eye. Subsequent investigations on the usual lines confirmed my view.

The appearance has been seen by me in only one other condition and this may give a clue as to its origin in glaucoma. The patient was a man suffering from megalo-cornea and cataract. The iris pattern was generally atrophic in appearance, but no tangential displacement was seen until the pupil was dilated. The phenomenon was then clearly visible and appeared to be due to atrophy or rigidity in one small area at the pupillary margin. With the slit-lamp one could see that the sphincter did not dilate in its entirety although the pupil dilated and was circular. It was as if a piece of elastic was formed into a band by the insertion of a small portion of string. Such a model would dilate into a complete circle with expansion of the rubber and the inelastic segment of string would conform to the circular pattern without itself expanding. If, to such a model, contractile radial trabeculae were attached it is obvious that tangential displacement would occur. So far I have not secured any histological material at a sufficiently early stage to provide any evidence in support of this suggestion.

Tangential displacement of the iris pattern is a common finding in chronic glaucoma and may occur in the early stages. It was found to be present in fourteen members of a series of thirty-five consecutive cases of chronic glaucoma. Although it is almost certainly a stage in the iris atrophy which occurs in the advanced condition, tabular evidence is presented which shows that it may be found in conjunction with good central vision. It is a sign subordinate to the findings of the tonometer and screen and certainly visual acuity is no index of the progressive severity of the disease. As inspection is usually carried out, however, before instrumental methods, the observation has a place in routine work. The serious nature of the eye condition may be suspected immediately if tangential displacement of the iris pattern is observed.

TEMPORARY CATARACTS IN DIABETES*

BY

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THE very transient lens opacities that occur in intense dehydration of diabetic coma and last 1 or 2 days were recently described by Lawrence, Oakley and Barne (1942). Apart from such acute dehydration a few cases of longer lasting but temporary cataracts have been recorded. Nettleship (1885) described three patients in whom cataracts rapidly developed as diabetes grew worse and cleared when the treatment either abolished or diminished the urinary sugar. In one case "symmetrical nuclear cataracts," which prevented recognition of large objects, disappeared completely in two weeks and small print could be read again—this by diet and opium treatment which diminished the urinary sugar from extremely high to moderate amounts. The cases are not described in great detail and the metabolic details are scanty, but the facts are authentic and clear. Alt (1906) describes the eye changes in a young woman with neglected and progressively severe diabetes. One morning while reading at 11 a.m. she was terrified by a sudden clouding of her right and later the left eye and at 5 p.m. Alt observed a large subcapsular opacity in the R. eye and radial streaks in the left. The strenuous diet she then submitted to reduced her sugar and in three weeks both lenses were quite clear

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and opacities never recurred although she died in coma 14 months later (I should mention that this author describes a temporary cataract as occurring in a phase of renal oedema). The fifth case is published by Braun (1935) who describes an emmetropic boy, aged 19 years, who developed defective vision fairly suddenly it seems before any treatment. After six days of insulin treatment Braun was asked to examine the eyes, found bilateral posterior rosette cataracts and saw them disappear completely in a further 10 days of insulin control. A sixth case of diabetic cataract is recorded by Fischer (1925) as improving under insulin, but the details are very scanty.

I had never noticed such phenomena until this year when in the following two cases cataracts both developed and cleared up while under treatment and fairly accurate observation.

CASE 1.—H.W., a thin male, age 39 years, came under treatment two months after the acute onset of diabetic symptoms. He had been myopic for years (−3 D.) but noticed no visual changes with the onset and development of diabetes. On diagnosis the diabetes was severe—intense thirst, night polyuria 5 pints, blood-sugar 416 mg. per 100 m.l., but no ketosis. He was immediately treated with insulin, responded easily and left hospital after 12 days with normal blood-sugar tests, on 200 grams C., and 12 units of protamine zinc plus 12 units soluble insulin. On the 4th day of treatment and of being sugar-free he complained of blurred vision and could see better without his glasses, obviously the usual temporary hypermetropia so common during " desugarisation." Both *lenses* were *clear* before treatment and remained so throughout this period and by the 12th day of insulin his usual visual focus and acuity were re-established as commonly occurs.

I saw and tested him three weeks later and found him in perfect diabetic control with a gain of 10 lbs. in weight. He complained that four days after leaving hospital, *i.e.*, 16 days of treatment, his vision got worse and that he noticed he could see better in a dull light. I vaguely expected this to be due merely to further refractive changes but was horrified to find the opacities depicted in Fig. 1, the rosette cataract in the right eye actually reaching the centre of the lens and obscuring the macula. As this finding was quite new in my experience with thousands of diabetic eyes, I did and said

FIG. 1.

nothing, fully expecting the opacities to be permanent if not progressive.

I did not see him until nine months later when I found both lenses entirely clear. This intelligent man gave the clear statement that within four days of my seeing the cataracts his vision underwent a sudden change in one day and became clear and normal, *i.e.*, three weeks' duration.

No slit-lamp examination was made so I am uncertain where exactly these opacities were situated. It is certain, however, that these changes came on and went suddenly over a period of three weeks, during which his sugar metabolism, though recently stabilised, was quite stable.

CASE 2.—W.B., an obese male, age 45 years, was seen at King's College Hospital only two weeks after acute symptoms of diabetes had developed: urine sugar 4 per cent., no ketosis, blood-sugar 380 mg. per 100 m.l. No change in vision, but he was a life-long myope (−7 D.). His lenses were quite clear. He was put on a diet of 120 grams C. without insulin. After *three days' diet* he first noticed misty vision and as this got worse he was sent to Croydon General Hospital where Mr. T. E. Davies, D.O.M.S., observed two central lens opacities and prescribed "Calcium Sodium Iodide ointment and drops." I re-tested his diabetes after *fifteen days of diet* and found the urine nearly sugar-free, the blood-sugar 200 mg. per 100 m.l., and saw the two central and ? posterior rosette cataracts. Further examination in four weeks (45 days' diet) showed a sugar-free urine, blood-sugar 140 mg. per 100 m.l. and perfectly clear lenses. Fortunately the patient works for an optical company and his employer, Mr. F. S. B. Ellis, D.B.O.A., has kindly furnished detailed information of the lens changes in this interval. No further noticeable change was found

FIG. 2.

until about the 28th day of diet. Then the right eye improved, the cataract lessened and, clearing in an outward and upward direction (see Fig. 2) completely disappeared in eight days. Then the left eye followed suit and cleared in another five days, again disappearing in an outward and upward direction.

The ultimate refraction and myopia are the same as before the diabetes.

Discussion

These two cases have much in common. Both were myopes but with otherwise normal eyes when first seen for diabetes. Both had quite high blood-sugar, but no ketosis and no signs of body dehydration although a minor degree is likely in diabetics with intense thirst, as they had. Both developed cataracts at a stage of much improved diabetes when the most likely humoral change in the eye might be presumed to be rehydration. In the first the cataracts appeared to commence about the 16th day of insulin treatment and lasted three weeks. In the second they seemed to begin about the third day of diet and lasted four to five weeks. Both were similar in their dark rosette appearance and in occupying the central and upper quadrant of the lens. Whether this position has any significance I do not know. The process seems quite different from the very common transient myopia and hypermetropias which occur respectively at the acute onset and subsequent control of the diabetes and last usually a few days to two weeks, for during even intense refractive changes the media remain quite clear.

My two cases seem to be the first in which cataracts were observed both to form and clear up in a previously normal lens. The other six cases were first observed when cataracts had already appeared, more or less quickly, in untreated diabetes and they disappeared when the sugar improved (not much by modern standards) by diet, four cases, and insulin, two cases.

In my cases on the other hand cataracts developed only during the *improvement stage* of treatment—indeed in the first case when full humoral normality may be presumed for some ten days. The duration of all these temporary cataracts seems to have been much the same, some two to four weeks.

I have insufficient knowledge (has any one?) of the physico-chemistry of the lens to venture on speculation on the causal mechanisms involved in the above phenomena. But as these cataracts can be brought on both by bad diabetes and by its treatment, the only common causal factor this suggests to me is *change in hydration*, both dehydration in progressively increasing diabetes and rehydration under treatment.

Summary

The development and disappearance of temporary cataracts in two diabetics under treatment is described.

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SOLAR ECLIPSE—BURN OF MACULA*

BY

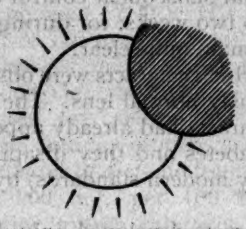
E. C. ZORAB, Major, R.A.M.C.

THE following case is of interest in view of its association with the recent partial eclipse of the sun.

2695379, Guardsman W.S.S., 1st Btn. Scots Guards, aged 27 years, came to see me on July 12, 1945, complaining of obscured vision in the left eye.

History.—No family history. Five years ago he was in Mersa Matruh for a year. During this time he was working in an outdoor cookhouse.

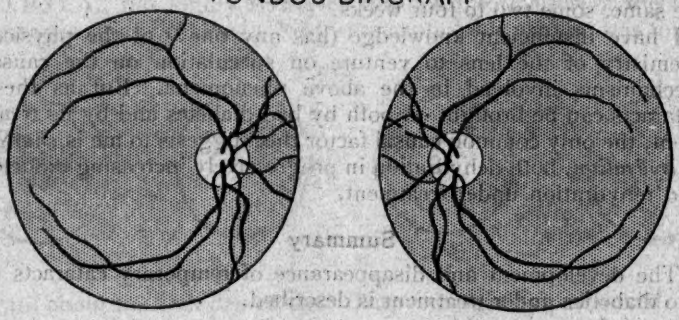
Towards the end of the year, he noticed that he was not seeing so well with his right eye. He was seen by an oculist at a British



Partial solar eclipse as seen Northern Italy.

Shadow as seen by Guardsman S.

FUNDUS DIAGRAM



Military Hospital and told that he did not need glasses, that the vision in the right eye was rather worse than the left, and that perhaps it was due to the sun. It has remained the same since, and

* Received for publication, September 29, 1945.

he has thought no more about it. Four days ago there was a partial eclipse of the sun. He was told about it by a friend and had a look at it through an ordinary cheap pair of smoked glasses. He says that although the sun seemed very bright he was determined to see it and had a good look lasting some seconds, probably about five. He did in fact manage to see what he was supposed to see, but ever since then, he has seen a black shadow in the centre of his vision in the left eye.

The partial eclipse was well seen in Northern Italy, and I myself saw it in various stages (though with better precautions than his). At its maximum, which was about the time he looked at it, it appeared, to my inexperienced eye, to be about 33 per cent.

On Examination.—R.V.=6/24 rapidly, but can struggle down to some letters of 6/9 by moving his eye from side to side.

L.V.=6/9 with one mistake and some letters of 6/6 but always with a black shadow in the centre. The shadow is the exact shape of the uneclipsed portion of the sun which he describes accurately, putting the moon shadow in the right place.

Both maculae show an identical appearance. There is no light reflex. The macula has a dark red spot in the centre about 0·25 mm. with a very pale area surrounding it of about 0·75 mm. diameter.

There is no appreciable error of refraction and no lens improves his visual defect.

July 20, i.e., 12 days after the eclipse.—Right eye: unchanged.

Left eye: Vision=6/9 and 6/6 partly, *i.e.*, unchanged. He still sees the same shadow, but it is less distinct and is very slightly to one side of the centre of vision.

On examination.—Left macula now has central light reflex. Pale area has become less marked and appearance is almost normal.

Comment

It is difficult to decide whether this man has a true macular burn in each eye; the right as a result of prolonged exposure in the desert and the left as a result of a few seconds' exposure to the sun rays partially filtered by smoked glasses, or whether he is a case of primary macular degeneration aggravated by sunlight.

I have seen three cases of macular damage which I attributed to sunlight. All were in men who had served more than three years in the Western Desert. Their maculae were not like these, but rather gave the appearance of a hole.

Lt.-Col. Rycroft has seen a larger number which he attributes to Western Desert service, but they also had "holes," either true or false, at the macula.

Holes at the macula after eclipse blindness have been reported by Harman and Macdonald, 1922; Rauh, 1927; Würdemann, 1936.

The appearances in this case are not those of holes. There is

no parallax, and the vision is far better than would be the case with holes. It is possible that a hole will develop later in the right eye but the left appears to be recovering.

The fact that he is emmetropic is consistent with a macular burn for the sunlight would be focused exactly on the macula.

A CASE OF ECLIPSE BLINDNESS*

BY

N. A. JEVONS, Capt. R.A.M.C.

PRIVATE J. H., aged 25 years. This patient has always had good sight and at one time was the best shot in his battalion. So far as is known there was no deterioration in vision until the onset of the present condition. There was no previous ophthalmic history.

On July 9, 1945, he looked at the partial eclipse of the sun, on the first occasion through a photographic negative for about one minute and during the succeeding hour on three separate occasions, each of about twenty seconds, without any protecting screen and mainly with his right eye.

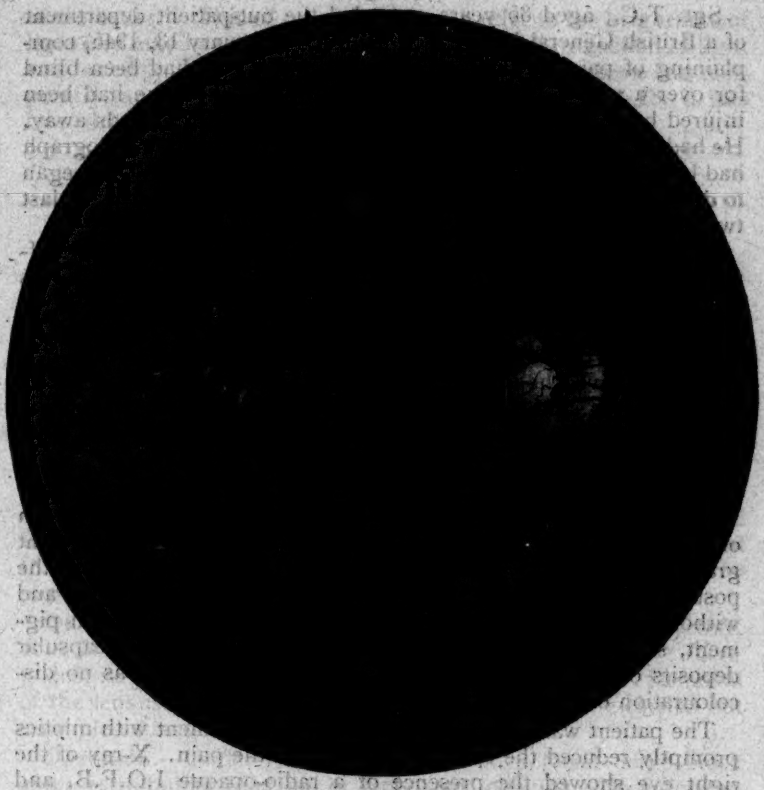
He first noticed symptoms on the following morning. On waking he had a slight ache in the inner corner of the right eye and immediately found that vision was blurred in this eye. Three days later he was referred to the Ophthalmic Department of a General Hospital in Italy.

On examination, V.R. was 6/18 (two letters). V.L. was 6/5. Both eyes were emmetropic. He volunteered the statement that when he looked directly at a letter on the test card he could only see each side of it. There was no evidence of inflammation in either eye. The pupil reactions were normal and the media clear. The only abnormal finding was at the right macula where there was a circular hole, about $\frac{1}{8}$ disc diameter across, with a flat base and steeply sloping sides. Around it, a faint ring reflex, due to oedema, could be seen. Examination with a Bjerrum screen showed the presence of a circular central scotoma of 1° to a 2 mm. white object and of about 2.5° to red.

On the following day he became aware of a circular black spot in front of the right eye and was conscious of this for three days.

One week later the macular oedema had subsided but apart from this there was no change. One month after the eclipse, some irregular patches of fine pigmentation had appeared around the hole. The visual acuity in the right eye was still 6/18 (partly) and the central scotoma could be demonstrated as before.

* Received for publication, September 29, 1945.



Comment.—A case of eclipse blindness is described, which showed the typical features of this condition—diminished vision, coming on within a few hours of exposure to the sun, the presence of a scotoma and a macular hole. The macular damage and diminished visual acuity appear to be permanent.

A CASE OF SIDEROSIS BULBI*

BY

J. E. L. BENDOR-SAMUEL, Capt. R.A.M.C.

THE following case illustrates the value of interference in an eye with siderosis bulbi even in an advanced state and is thought worthy of publication in view of the possible frequency of such cases after war injuries.

* Received for publication, September 29, 1945.

Sgt. T.C., aged 35 years, attended the out-patient department of a British General Hospital in Italy, on February 13, 1945, complaining of pain in his right eye which he stated had been blind for over a year. Questioning elicited the facts that he had been injured by firing a rifle at a " dead " grenade 20-30 yards away. He had made no complaint of the eye at the time and no radiograph had been taken. Vision remained the same for some time but began to deteriorate rather less than a year after the incident. For the last two or three weeks the eye had been painful.

On general examination the most striking feature was the difference in colour between the two eyes. The normal left eye was a light blue while the right was a dull brown. Inspection of the right eye showed the cornea to be oedematous and infiltrated with spots of dark brown pigment. The anterior chamber was shallow, the pupil active, the iris a uniformly dirty brown colour, but with a visible pattern, and the lens was opaque. The tension was markedly raised, thus accounting for the pain. Vision was reduced to P.L. and the projection of light was noted as inaccurate.

The left eye was normal and had vision of 6/5.

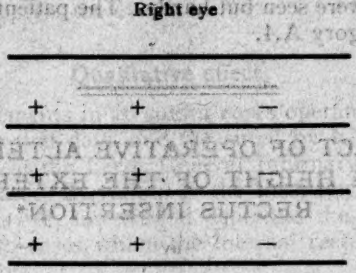
On slit-lamp examination of the right eye a punctate infiltration of the sub-epithelial layer of the cornea with fine brown pigment granules was seen over the whole area; there were no cells on the posterior corneal surface. The anterior chamber was shallow and without " flare." The iris, diffusely discoloured with brown pigment, showed no sign of atrophy or inflammation. Subcapsular deposits of pigment were seen in the lens, but there was no discolouration of the opaque lens cortex.

The patient was admitted to hospital and treatment with miotics promptly reduced the tension and relieved the pain. X-ray of the right eye showed the presence of a radio-opaque I.O.F.B. and on March 19, posterior sclerotomy was performed.

Operation.—Under local anaesthesia and sub-Tenon infiltration with 2 per cent. novutox, a conjunctival flap was reflected in the infero-external quadrant. Cautery haemostasis was maintained. A 3 mm. linear stab incision was made in the sclera 10-12 mm. from the limbus, using a broad needle as the active pole of a diathermy apparatus with a current of 40 milliamps. By this means a reaction was obtained in the choroid and retina which reduced the risk of subsequent haemorrhage and detachment; at the same time there was little tendency for the edges of the scleral wound to gape. The tip of the giant magnet was applied to the wound and a metallic foreign body 2 mm. x 1 mm. in size was removed without difficulty. The wound edges were cleared. No scleral suture was required. The area was insufflated with penicillin in sulphathiazole (2,000 units Na. penicillin per gm.) and the conjunctiva closed.

After the operation, the patient stated that he was " beginning

to see better." This of course could only refer to the brightness of light and may have been purely subjective. His projection of light was tested on April 2 and was recorded as accurate above and temporally, and inaccurate below and nasally. On April 18, it was treated again and charted thus :—



This result was checked objectively by throwing a narrow beam of light into the eye when it was seen that while the beam entered from the temporal side the pupil contracted, but when it entered from the nasal side between " 1 and 5 o'clock " there was no pupillary response.

On April 24 the case was reviewed by Lt.-Col. Rycroft, R.A.M.C. Adviser in Ophthalmology, who reported : " there is definite projection in the mid line and temporal field. Removal of the lens is justified." Accordingly the next day he carried out a simple extraction.

Operation.—Under local anaesthesia and a facial nerve block and a retro-bulbar injection of 2 per cent. novutox. No speculum was employed in view of the tendency to raised tension. Retraction was by lid sutures and a superior rectus stitch gave good exposure and firm control of the eye without global pressure. A No. 0 silk mattress suture was passed through the superficial layers of the cornea at " 12 o'clock " within the limbus and through the conjunctiva outside the limbus but not tied (Stallard suture). The loop was drawn well away from the globe. A Graefe section was made extending from " 10 o'clock to 2 o'clock," the point of the knife dividing the anterior capsule on its way across the anterior chamber. As the section was completed the knife emerged between the two arms of the mattress suture. The lens was delivered in the usual way, the iris replaced and the mattress suture tied. There was no vitreous loss. The superior rectus stitch was removed, the eye closed and the two lid sutures tied together. Examination of the lens cortex revealed no ferrous granules.

Recovery was uneventful and a month later, the corrected vision

was 6/12. Slit-lamp examination at this time showed punctate deposits of ferrous pigment on the posterior capsule. On May 15, discission of the post. capsule was performed with a Ziegler knife and a good gap obtained. The patient was last seen on July 6. Vision was then correctable to 6/12. The visual field was contracted down to 45° on the temporal side and to 20° on the nasal side. Fundus details were seen but hazily. The patient returned to duty in Medical Category A.4.

THE EFFECT OF OPERATIVE ALTERATIONS IN THE HEIGHT OF THE EXTERNAL RECTUS INSERTION*

BY

JOHN FOSTER *and* E. C. PEMBERTON

LEEDS

IT will be observed from the literature that operative correction of the vertical element of convergent concomitant squint is more readily undertaken in America than in England.

Such correction is usually obtained in America by operating on the superior or inferior recti and obliques, and may precede operation on the horizontal muscles.

We suspect that the wide use of the cover test of Duane which is more informative than the major amblyoscope in cardinal positions above and below the horizontal, may be responsible for this.

The writers venture to doubt if there is in Great Britain even a single set of the large (37 mm.) square prisms which facilitate quantitative application of Duane's test. These remarks in no way decry the accuracy of the synoptophore as an indicator of the degree of fusion or the horizontal or vertical angles near the horizontal plane and with which all measurements in this paper were made. Where marked alterations in the vertical angle take place during horizontal movement, an operation on a vertically acting rectus or an oblique muscle is unavoidable, but where this angle is small and constant, attempts have been made by certain European surgeons to correct this vertical element by raising or lowering the external rectus while advancing or resecting it.

Differing opinions have been expressed verbally to me by colleagues, on the effect of deliberately raising the insertion. Some believe it elevates the eye, others that it depresses it.

Ronne (*Acta Ophthal.* 23. I.fasc.1, p. 48) has expressed the third

* Received for publication, November 28, 1945.

view that if the muscle is raised without raising the conjunctiva there is no vertical effect at all.

In an attempt to settle this problem, as my own clinical results had been uncertain (*Trans. Ophthal. Soc. U.K.*, 1942 LXII. 320) the external rectus was attached to the upper part of the limbus under surface cocaine anaesthesia in two eyes prior to excision, and appeared to depress the eye.

Qualitative effect

Careful measurements in 26 squint cases operated on by myself or assistants since that date, and measured by E. C. Pemberton, Senior Orthoptist at the Leeds General Infirmary, show that the converse is the case. Elevation of the insertion of the external rectus elevates the eye, lowering it depresses the eye. The same rule applies to two cases where the internal rectus insertion was displaced vertically.

Theoretically one would expect cyclophoria to follow, and this did in fact occur in two cases, though without serious effect.

Quantitative effect

The external rectus in an eye with convergent squint varies so greatly in breadth and thickness, that one would not expect the same elevation of the globe from an identical procedure in each case. The figures given below are only averages, but in practice have proved consistent enough to be of help in making a decision clinically. It would appear that marked shortening of the muscle increases the vertical effect.

External rectus.

Whole width raising with resection and advancement	= 11·2$^{\Delta}$
Whole width raising with resection alone	= 7$^{\Delta}$
Half width raising with resection and advancement	= 9$^{\Delta}$
Half width raising with resection alone	= 5·4$^{\Delta}$

Internal rectus.

Half width raising = 2·75$^{\Delta}$

In the tabulated results which follow, the horizontal error is quoted in degrees, and the vertical in prism dioptres, according to the usual convention for synoptophore measurements. The measurements were taken (*a*) pre-operatively and (*b*) one week (*c*) one month post-operatively.

In one case owing to a misunderstanding, the muscle was raised instead of lowered, thus aggravating the error to an extent consistent with the above findings.

Operations Involving Raising/Lowering of External Rectus for Correction of Hypertropia

N.B.—Horizontal error in Degrees; Vertical in Prism Dioptres

Case	No.	Pre-op. Dev.△	Operation	Post-op. Dev. △ 1 week post-op.	Final Dev. △ 1 month later	$\frac{O}{O}$ Reduction △
1 E. S.	30179	+20° R/L 5△	R.E. Recession 5mm., Resection 5mm., with 1/2 breadth lowering	−11 L/R 1△	0° to −3° R/L 2△ S.B.V.	3△
2 D. W.	37461	+34° L/R 16△	L.E. 5:7:3 with full breadth lowering	+7° L/R 3△	?dist. Wing c gl. Exo. 2 L/R 3△ S.B.V.	13△
3 C. G.	5110 or 6110	+22° L/R 11△	L.E. 5:7:3 with full breadth lowering	+8° L/R 1 −2△	+8° L/R 1 −2△	10△
4 W. B.	7000	+15° L/R 8 −10△	L.E. 5:5 with 1/2 breadth lowering	+9° L/R 5△	+8° L/R 6△	4△
5 J. F.	9482	+34° L/R 11△	R.E. 5:7:4 with 1/2 breadth raising	+7° L/R 6△	+10° L/R 4△ R.E. extorsion 7° (variable)	7△
6 I. W.	1205	+28° L/R 11△	R.E. 5:5:3 with full breadth raising	+9 to 11° L/R 1△	+4° $\frac{O}{O}$ nil S.B.V.	11△
7 G. W.	8312	+23° R/L 2△	R.E. 5:7 with 1/2 breadth lowering	+5 to 9° L/R 1△	+9° L/R 5△	7△
8 J. M.	10524	+27° L/R 9△	R.E. Adv. and Recession with full width raising of R.E.R.	+14° R/L 5△	+14° R/L 5△	14△ and was over-corrected
9 L. E.	31146	Var. +12° to +24° L/R 15△	L.E. 5:5 with full width lowering	+13° L/R 12△	+8° L/R 8△	7△
10 P. H.	2114	+16° L/R 7△	L.E. 5:5 with full width lowering	−5° L/R 1 −3△	0° $\frac{O}{O}$ nil	7△
11 A. B.	35055	+13° R/L 6△	R.E. Adv. +Rec. with 1/2 width lowering	+7° R/L 1△	+7° L/R 3△	9△ and was over-corrected
12 R. F.	17487	+28° L/R 5△	L.E. 5:10 with 1/2 width *raising* L.E.R. (error)	+1° L/R 12°	+8° L/R 9△	L/R *was increased* by 4△
13 J. P.	17646	+42° L/R 14△	L.E. 5:9 3 with 1/2 width lowering	+7° no $\frac{O}{O}$ but L.E. excycl. 10°	+7° R/L 1△ L. excycl. 4°	9 −15△
14 L. A.	11994	+22° L/R 5△	L.E. 5:6:3 with 1/2 width lowering	−1° no $\frac{O}{O}$	−2° R/L 9△	14△ (over-corrected
15 P. G.	37729	+25° R/L 5△	L.E. 5:6:3 with 1/2 width raising	+7° L/R 1△	Not seen since	4△

Operations Involving Raising/Lowering of External Rectus for Correction of Hypertropia—continued

N.B.—Horizontal error in Degrees; Vertical in Prism Dioptres

	Case	No.	Pre-op. Dev △	Operation	Post-op. Dev. △ 1 week post-op.	Final Dev. △ 1 month later	$\frac{O}{O}$ Reduction △
16	I. K.	16880	−13° to −20° L/R 7△	L.I.R. re-advancement with 1/2 width lowering of *Int. Rect.*	−3° to −12° L/R 4△	−8° to −12° L/R 5△	2△
17	L. M.	13431	−28° R/L 8△	Tenot. L.E.R. 4mm. resect. L.I.R. c̄ 3mm. raising	+4° R/L 8△	−2° R/L 4 − 6△	2 − 4△
18	E. W.	15535	+21° L/R 6△	R.E. 5 : 3 with 1/2 width raising	+10° to +17° L/R 6△	+9° L/R 6△	Nil effect
19	G. P.	7229	+35° L/R 6 − 7△	R.E. 5 : 10 with 1/2 width raise	+13° L/R 2△	+12° to +16° L/R 3△	3 − 4△
20	B. G.	25393	+26° R/L 9△	12mm. resect. L.E.R. with 1/2 width raising (had had previous bilat. op.)	+12° R/L 5△	+13° R/L 5△	4△
21	I. E.	6659	+20° L/R 7△	R.E. 5 : 8 c̄ 1/2 width raising	0° R/L 3△ F.R. L/R 2△ F.I.	+2° $\frac{o}{o}$ Nil weak S.B.V.	7△
22	Mrs. J. P.	29253	+40° L/R 11△	L.E. 6 : 10 c̄ 1/2 width lowering	+6° R/L 1△	+6° L/R 4△	7△ under-corrected
23	T. P.	1134	+20° R/L 3△	L.E. 4 : 4 c̄ 1/4 width raise	+10° R/L 1△	+3° $\frac{o}{o}$ Nil	3△
24	E. M.	23016	+20° L/R 7△	R.E. 5 : 4 c̄ 1/2 width raise	+2° R/L 7△	+2° L/R 2△	5△
25	M. C.	20144	+19° L/R 3 − 5△	R.E. 5:7 c̄ 1/2 width raise	+10° R/L 6△	+3° R/L 2△ occas. S.B.V.	5 − 7△
26	J. L.	31058	+39° L/R 3△	R.E. 5 : 10 : 4 1/4 width raising	−5 R/L 2 − 4△	+4° $\frac{o}{o}$ Nil occas. S.B.V.	3△

The figures in the column labelled "operation" represent the recession, resection, and advancement respectively, in millimetres. *Cf.* 5 : 7 : 3 represents 5 mm. recession, 7 mm. resection, 3 mm. advancement.

Six Nos. 1, 2, 6, 21, 26 of these cases were having orthoptic treatment, and it was hoped that alteration of the vertical at the same time as that of the horizontal element, might lead to single binocular vision. In three cases this was achieved within a month, and in two others the continuing improvement in the squint leads

the orthoptic department to think that it will still occur. In one other case there is no possibility of it occurring. Single binocular vision also occurred unexpectedly in two cosmetic cases after operation.

As the conjunctiva was completely detached from the muscle before advancement or resection, and carefully replaced in its original position afterwards, it is difficult to believe it has any effect on the position of the eye in our cases.

Summary

The results of raising or lowering the external rectus insertion on twenty-six cases of concomitant squint suggest that :—

(1) There is some justification for this when the vertical error is constant, and less than 11△ at all horizontal angles.

(2) The eye moves in the direction in which the insertion is moved.

(3) This movement is independent of the position of the conjunctiva.

MENINGIOMA OF THE TUBERCULUM SELLAE WITH BI-TEMPORAL HEMIANOPIA*

BY

W. R. MATHEWSON

EDINBURGH

In October, 1942, a woman, aged 61 years, complained of inability to see with the left eye, duration three months, but vision was R.E. 6/18 and L.E. 6/18 and was corrected to R.E. 6/6/pt. and L.E. 6/6/pt., in spite of early lens opacities. Later her physician, Dr. Ivor Menzies, reported the general health satisfactory and the Wassermann reaction negative. Dr. A. H. H. Sinclair kindly saw her later in consultation, confirming the fields and adding further points, whilst Dr. Malcolm Farquharson reported Ear, Nose and Throat examination negative, as likewise were X-rays, taken by Drs. King and Allen.

Mr. Norman Dott operated on January 12, 1944, after further investigations including lumbar puncture and electro-encephalogram.

In May, 1943, vision with glasses was R.E. 6/18, L.E. 6/12, and though field defects were instinctively suspected, the diminution was too largely ascribed to lens changes, and field examination deferred, though partly on account of her temperament, which it was feared would render field examination long and difficult, a

* Received for publication, May 31, 1945.

fear that was later proved to be well founded. She was directed to report immediately, however, should there be any further developments, but she did not come till November 1943, by this time complaining of hemianopia of three months' duration, and vision with glasses was R.E. 6/60, L.E. 6/18.

The importance of developing a clinical instinct, and of being led by it in planning and making one's scientific investigations of a patient's case, used to be emphasised by Foster Moore in his Clinic at Moorfields, and had this advice been followed here, there is no doubt that the diagnosis would have been made earlier, and perhaps grey fields found (see *Trans. Ophthal. Soc. U.K.*, Vol. LXIII p. 143, 1943).

Tension.—In November, 1943, was R.E. 23, L.E. 23.

Lenses showed some early opacities but by this time, November 1943, it was obvious that the diminution in vision was greater than the lens opacities could account for.

Fundi showed, in November 1943, optic atrophy, more temporal than nasal, more marked in the left optic nerve, and the edges of the left disc appearing more clearly cut.

The tumour at operation was found to be mainly anterior to the chiasma and pressing on the medial side of the right optic nerve, which was stretched over it laterally, but also extending backwards below the chiasma, flattening it, and a portion extending upwards to the posterior aspect of the chiasma, a condition corresponding well with the field findings.

Fields were characteristic of a pre-chiasmal tumour, bitemporal hemianopia was present, the details of form, development, and recovery, being as described below.

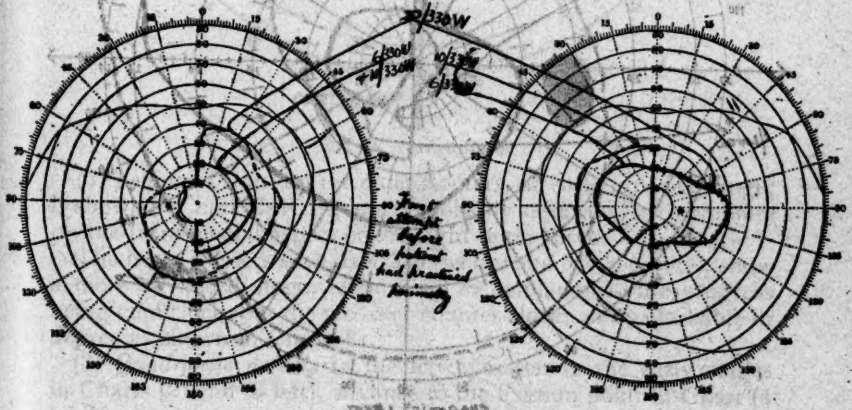


CHART 1.—Mrs. B., Nov. 5, 1943

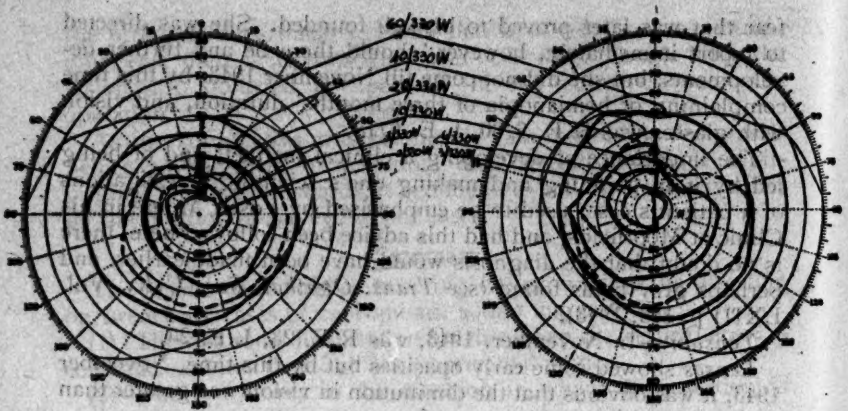
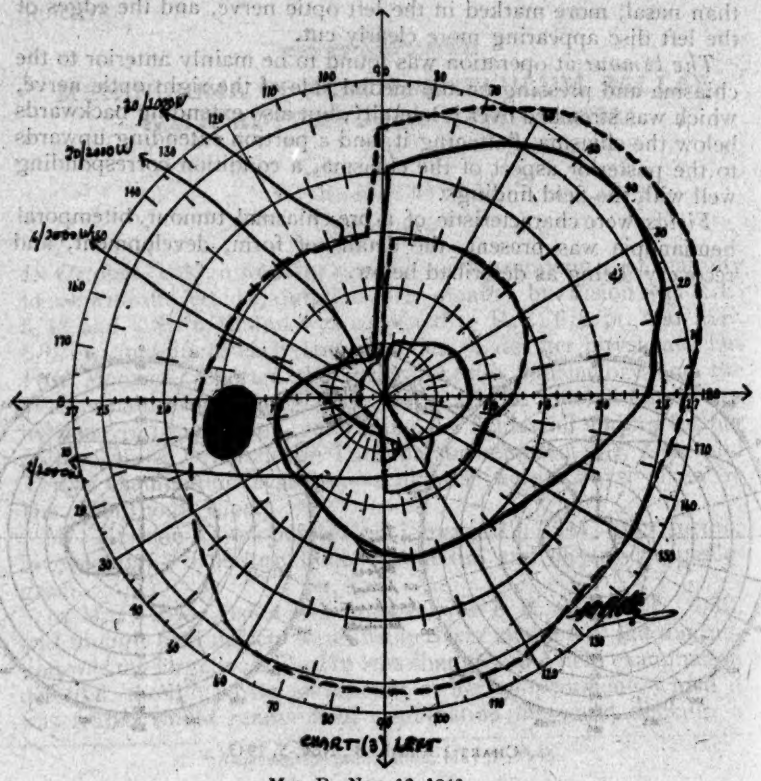
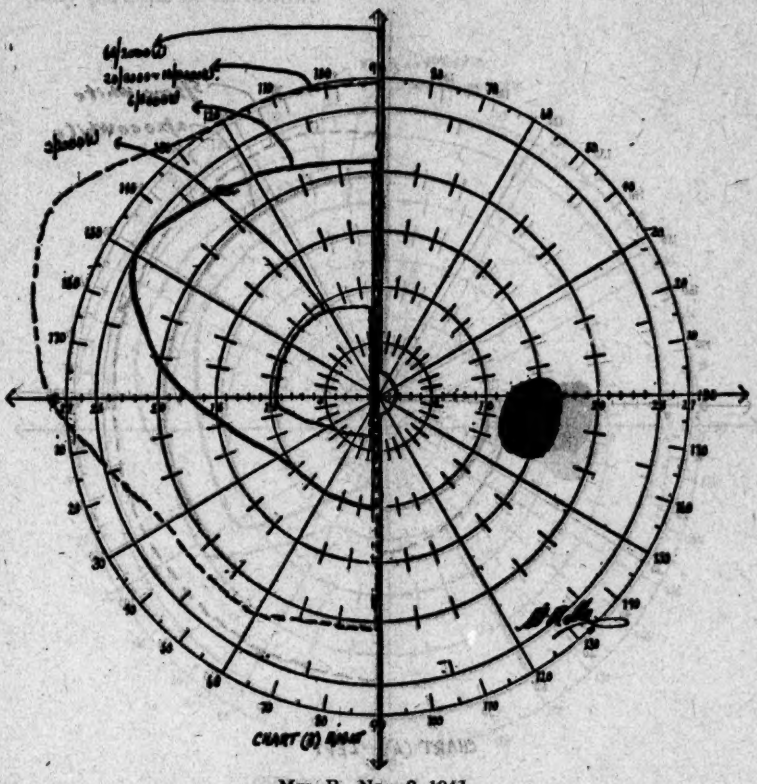


CHART 2.—Mrs. B., Nov. 9, 1943



Mrs. B., Nov. 10, 1943

(1) *General depression* is present, and is associated with nerve compression, for instance, the isopter for 2/330 (white) being so reduced that its normal position is, roughly speaking, occupied by the isopter for 60/330 (white) as shown in Chart (2). Chart (3) also exhibits reduction.



Mrs. B., Nov. 9, 1943

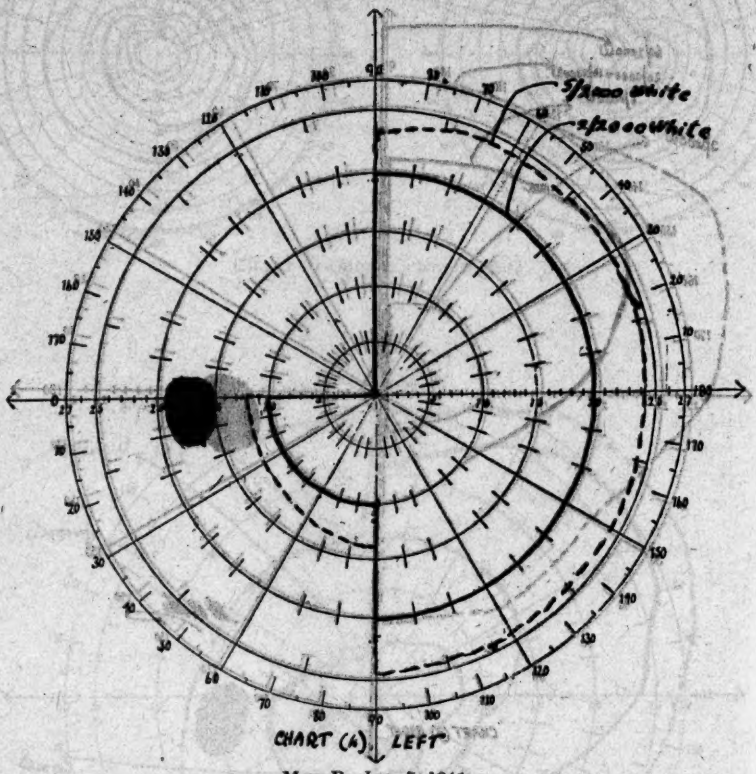
(2) *Temporal slope* for the outer isopters, an early type of change, is shown in Chart (2) R.E., and is probably associated with pressure on the infra-medial aspect of the right optic nerve.

The inner isopters such as 6/330 (white) and 3/330 (white), show a more advanced stage, amounting to hemianopia, the progress being cum clock, but the recovery counter clock, and remarkable in degree as shown in Chart (6).

(3) *Quadrantic defects* in the left eye seen in the early stages in Charts (2) and (3 left), advance to the fixation point in Chart (4 left) and partly recover in Chart (6). These quadrantic defects are

probably to be associated especially with pressure on those fibres from the left optic nerve which pass into the genu in the right optic nerve after crossing the chiasma in its anterior part.

The progress in the left eye, as is typical in pituitary region tumours, is counter clock and in Chart (3 left) is shown to have.



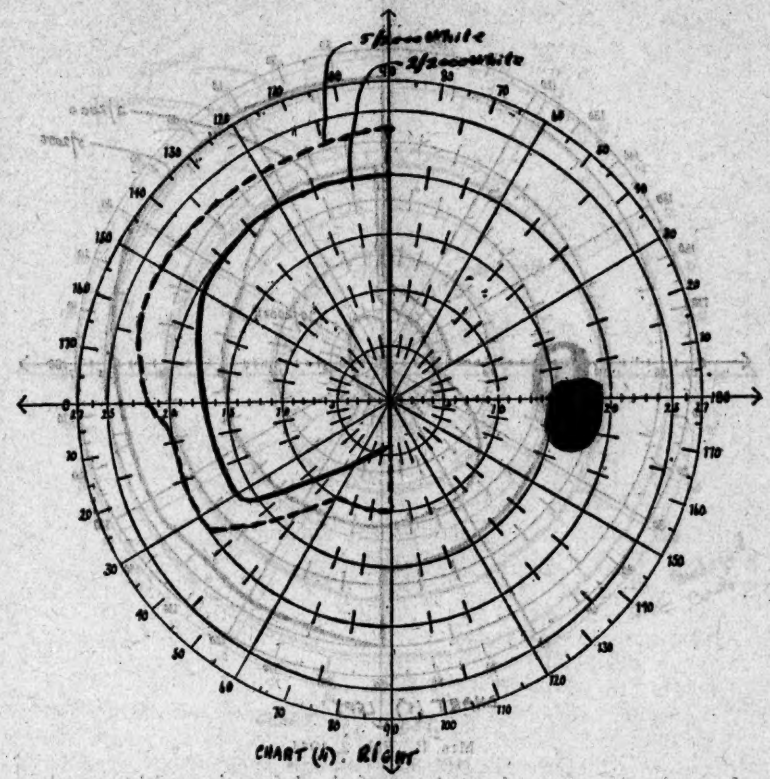
Mrs. B., Jan. 7, 1944

invaded the nasal field for 2/2000 (white), whilst Chart (6 left) demonstrates the cum clock recovery.

(4) *Bitemporal hemianopia*, incongruous and non-scotomatous, duly developed as the more complete picture of fields due to a tumour, mainly pre-chiasmal, and pressing more on one optic nerve, though also on the chiasma. The progress in the last few months was rapid as seen in Charts (2), (3), (4), (number 4 being taken in Mr. Dott's Department), with invasion of the nasal field as seen in Chart (3 left), in the isopter for 2/2000 (white) and in Chart (4 right).

(5) *Comparing the right and left fields* it could be easily understood that the tumour pressing on the medial side of the right optic nerve would produce a comparatively clear cut hemianopia.

But as the tumour did not press similarly on the left optic nerve the development of the left hemianopia requires explanation, which may perhaps be as follows.



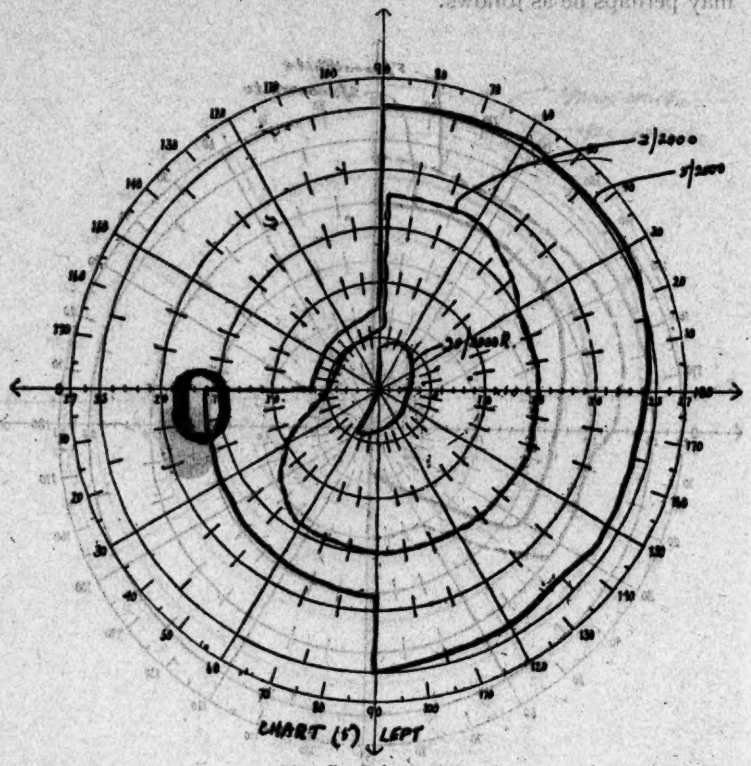
Mrs. B., Jan. 7, 1944

First, the tumour pressing on the right optic nerve would produce in the right eye the temporal slope seen in Chart (2) and then, as it increased in size, it would produce the practically complete hemianopia seen in Chart (3 right).

Then, as the tumour extended towards the chiasma it would press on the fibres from the lower nasal quadrant of the left optic nerve, either as they passed across the anterior part of the chiasma or probably at an even earlier date in the sharp genu these fibres

form in the right optic nerve, before proceeding to the right optic tract. Such pressure could produce the upper quadrant defects seen in the left fields, Charts (2), (3) and (4).

Thereafter the tumour, extending still further under the chiasma and behind it, as found at operation, would press on the fibres



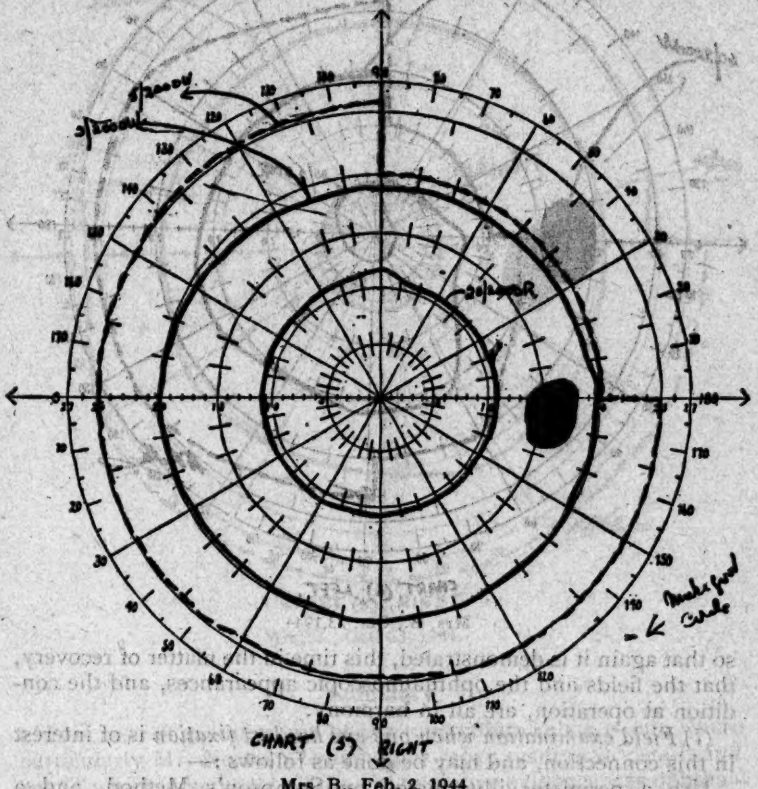
Mrs. B., Feb. 2, 1944

from the upper nasal quadrant of the left retina, either as they passed across the posterior part of the chiasma before proceeding to the right optic tract, or as they enter the right tract, or probably at an even later date, in the blunt genu these fibres form in the left optic tract.

Such pressure could produce the lower quadrant defects seen in Chart (3 left), 6/2000 (white) and 2/2000 (white), Chart (4 left), 5/2000 (white), and it is to be noted that it was only at the comparatively late date when this chart was made, and when the tumour was probably progressing rapidly, that hemianopia manifested

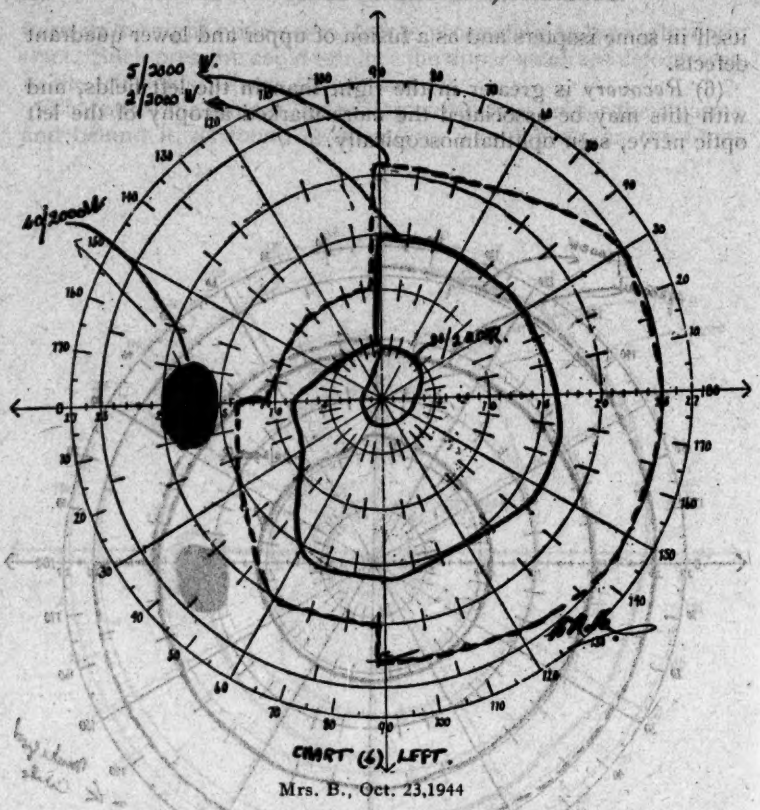
itself in some isopters and as a fusion of upper and lower quadrant defects.

(6) *Recovery* is greater in the right than in the left fields, and with this may be associated the more marked atrophy of the left optic nerve, seen ophthalmoscopically.



Mrs. B., Feb. 2, 1944

Both the lesser degree of recovery of the left fields and the greater degree of atrophy of the left optic nerve may perhaps be associated with the idea that whilst in the case of the right nerve the tumour pressed on the nerve where it could be stretched, and stretched it, producing for the most part only physiological block, the tumour pressed on the left nerve at a point where stretching was not so possible, that is, in the less elastic chiasmal region, definitely damaging the left nerve fibres. Charts (3) and (6) show that the right fields had greater hemianopia and greater recovery, and at operation the tumour was actually found to have flattened the chiasma,



Mrs. B., Oct. 23,1944

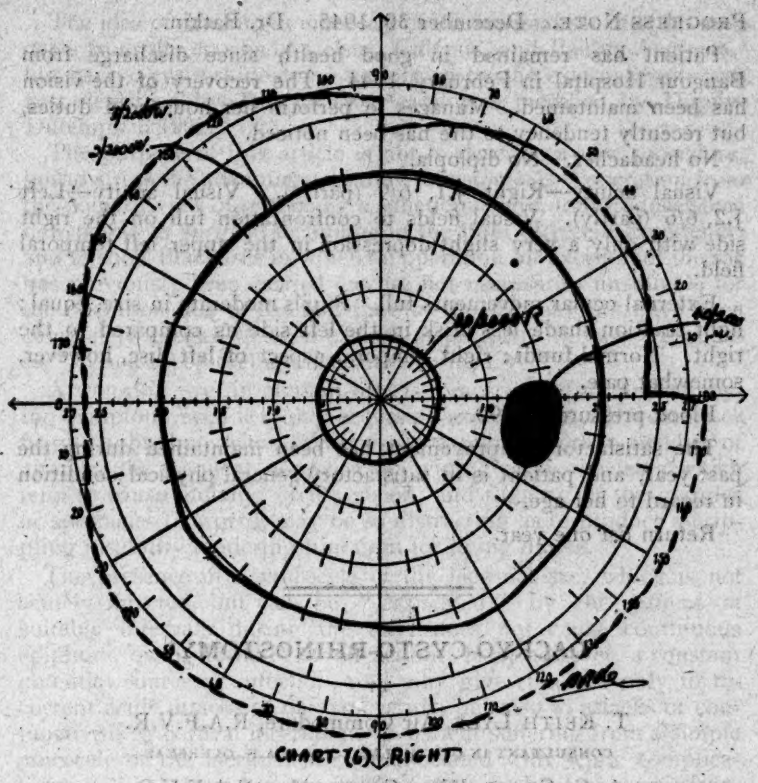
so that again it is demonstrated, this time in the matter of recovery, that the fields and the ophthalmoscopic appearances, and the condition at operation, are all in harmony.

(7) *Field examination when one eye has lost fixation* is of interest in this connection, and may be done as follows :—

Use a perimeter illuminated by Sampson's Method, and a Bjerrum's Screen by Messrs. Clement Clarke's Method.

Let us suppose the right eye has lost fixation.

Place before the left eye a red glass and also an amber glass, and examine the fields of the right eye with Traquair's green discs as supplied by Messrs. A. H. Baird, Edinburgh, or use a green and also an amber glass before the left eye, and examine the fields of the right eye with red discs. Several isopters should, of course, be examined avoiding, as far as possible, mechanical contrivances, and if necessary a very large fixation object of white paper may be used.



Mrs. B., Oct. 23, 1944

Summary

This case of meningioma of the tuberculum sellae is one where particularly Mr. Norman Dott's notes repay reading in detail, and one in which practically all the pre-operative evidence was ophthalmological and specially shows the value of field examination and the great onus on the ophthalmologist.

In what is written above only the outlines of the ophthalmological examinations are given, but even these outlines show how the varying visual acuity, the onset, course, and recovery of the incongruous bitemporal hemianopia, the ophthalmoscopic appearances, and the appearances at operation were all in harmony to a remarkable degree.

On October 23, 1944, vision with glasses I had prescribed in 1942 was, R.E. 6/6 and J.1, L.E. 6/9 and J.6.

PROGRESS NOTE. December 30, 1945. Dr. Batkin.

Patient has remained in good health since discharge from Bangour Hospital in February, 1944. The recovery of the vision has been maintained. Manages to perform her household duties, but recently tendency to tire has been noticed.

No headaches. No diplopia.

Visual acuity—Right J.1, 6/9 (partly). Visual acuity—Left J.2, 6/6 (partly). Visual fields to confrontation full on the right side with only a very slight depression in the upper left temporal field.

External ocular movements full. Pupils moderate in size, equal; light reaction shade less brisk in the left side as compared to the right. Normal fundi; right temporal aspect of left disc, however, somewhat pale.

Blood pressure 145/90.

The satisfactory improvement has been maintained during the past year, and patient is in satisfactory general physical condition in regard to her age.

Return list one year.

DACRYO-CYSTO-RHINOSTOMY*

BY

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FORMER SENIOR EAR, NOSE AND THROAT SPECIALIST, R.A.F.

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REPORTS of the satisfactory results of the operation of dacryo-cysto-rhinostomy, in cases of chronic dacryocystitis associated with obstruction of the naso-lacrimal duct, have been published in recent years by Morgan,[1] Yanes,[2] Lethrop,[3] and others, but this procedure is not universally adopted, and extirpation of the lacrimal sac has been the routine operation in most eye clinics.

* Received for publication, December 19, 1945.

The idea of draining a mucocele of the lacrimal sac into the nose dates from the epochs of Celsus, Galenus, and Paulus Aegineta,[4] but dacryo-cysto-rhinostomy performed by the external route was first described by Toti in 1904,[5] and was modified by Dupuy-Dutemps in 1921.[6 7 8]

The purpose of this article is not to describe a new procedure, but to stress the advantages of the "anastomosis" operation from the point of view of producing a functional cure, to introduce some new points in surgical technique in the light of recent experience, and to show that cases in which an operation for excision of the sac has previously been carried out are not necessarily unsuitable for the operation due to the fact that (*a*) the sac may not have been completely excised or even excised at all, or (*b*) a new "pseudo-sac" lined by epithelium may have formed.

A watering eye, in civilian life, is a most irritating and annoying symptom, even if it only occurs on exposure to cold weather or bright light, but, when occurring in a pilot, or other member of aircrew, the frequent necessity for wiping away the tears which tend to cause blurring of the vision, and fogging of the goggles or spectacles (if worn), may be so distracting as to produce a crippling disability rendering him unfit for flying duties.

The presence of a mucocele of the lacrimal sac, which is not acutely infected, but can be "expressed" by the patient at suitable intervals during the day, does not cause continuous epiphora, owing to its reservoir action. It is, however, a constant potential source of infection, and may give rise, not only to recurrent acute attacks of dacryo-cystitis, but also to attacks of conjunctivitis or corneal ulceration. A patient suffering from a simple mucocele of the lacrimal sac, unassociated with septic complications, will not, from his own point of view, derive any benefit from having his sac removed, because, instead of the occasional need for digital expression of the sac contents, he will be affected with a more or less constantly watering eye. Such a patient will, however, derive much benefit from a dacryo-cysto-rhinostomy, whereby a new and direct channel is made from the lacrimal sac into the nasal cavity. Moreover, it has been shown by Hughes, Guy and Bogart,[9] that bacterial cultures are more frequently obtained from the conjunctival sac after dacryo-cystectomy than after dacryo-cysto-rhinostomy.

The commonest site of occlusion of the naso-lacrimal duct is probably at its upper end, in the region of its junction with the sac. During the last five years, numerous examples of occlusion by trauma have been encountered. Air crashes may, (in spite of the "harness" worn in most operational aircraft), cause the pilot's head to be thrown forward and to hit the instrument panel or rudder bar, resulting in fracture of the facial bones. The bone in the region

of the naso-lacrimal canal may thus be broken, the fragments pressing upon, or tearing, the naso-lacrimal duct, or lacrimal sac. It has been possible, in several instances, to demonstrate at operation the presence of portions of partially detached bone causing such obstruction. These fractures are, frequently, difficult to detect radiologically, owing to the small and flake-like nature of the fragments, but some information may be obtained from a stereoscopic antero-posterior view. It might be suggested that, in such cases, removal of the offending fragments of bone would result in restoration of the patency of the tear tract. The formation of scar tissue, however, renders such a possibility most unlikely.

A history of previous attacks of acute dacryo-cystitis is not a contra-indication to the operation of dacryo-cysto-rhinostomy, nor does the presence of a lacrimal fistula prejudice a good result. Furthermore, *a satisfactory result may be obtained when excision of the sac is said to have been already performed,* although some modification of technique may be necessary.

It has been stated that a serious complication of the anastomosis operation is the occurrence of conjunctivitis whenever the patient has a " cold in the head." This has been observed in one case only, and has been mild and transient in nature.

Technique

Pre-operative examination.—An examination of the nasal cavity (including X-ray examination if indicated) is made, and any obvious abnormality or infection, *e.g.* nasal polypi, sinusitis or a grossly deflected septum is dealt with before the operation of dacryo-cysto-rhinostomy is undertaken, so that as far as possible a clean field of operation is available.

In a certain number of cases lipiodol has been injected into the lacrimal sac and the site of obstruction demonstrated radiologically. This has invariably been situated at the upper end of the naso-lacrimal duct.

Preparation and Anaesthetic.—The nasal cavity on the affected side is packed, half an hour before operation, with ribbon gauze soaked in equal parts of 10 per cent. cocaine and 1/1,000 adrenalin, as in all intranasal operations. This limits haemorrhage from the nasal mucosa when it is incised.

Local or general anaesthesia may be employed, the latter being more satisfactory, and invariably used in our series of cases. It must be given through an intra-tracheal tube, the nasopharynx being packed to prevent blood draining downwards into the bronchi. An ether and oxygen mixture is usually employed. Premedication of opoidin gr. 1/3rd and scopolamine gr. 1/150 is given one hour before operation. A quarter of an hour before the incision

is made, an injection of 2 per cent. novocain and 1/1,000 adrenalin is given freely into the soft tissues between the root of the nose and inner canthus, and between the inner end of the eyebrow and inner part of the lower orbital margin. This helps to reduce haemorrhage when the incision is made in this very vascular area.

Operation.—The site of the incision, (Fig. 1), is higher and more medial than the classical one, as described by Toti. It is commenced midway between the inner canthus and the root of the nose, and carried down the side of the nose, curving slightly outwards, so as to end about an inch vertically below the lower punctum. The

FIG. 1.
Site of skin incision.

incision is carried right to the bone through the soft tissues, and all the tissue, including the periosteum and the attachment of the internal lateral ligament, which lies on the lateral side of the incision, is detached from the bone in one layer by means of a periosteal elevator, and displaced outwards. When the outer lip of the incision is retracted outwards, the lacrimal sac and upper end of the naso-lacrimal duct, (Fig. 2), are seen lying among the structures so everted. The inner quarter of the rim of the orbit should be thoroughly exposed, so that the fossa for the lacrimal sac is accessible *in its entire length*. No attempt should be made to dissect out the sac or duct before this is done, as the fossa is the guide to the sac. Bleeding points are secured in the usual way with fine artery forceps, but in addition the use of a " sucker " is desirable in order to keep the operation field quite dry.

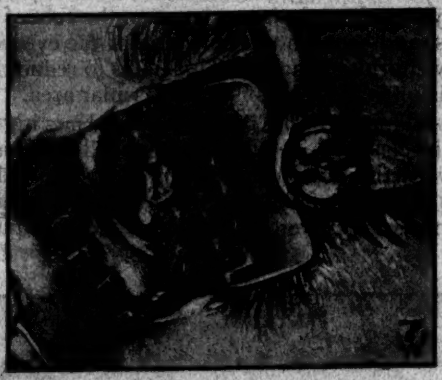

FIG. 2.

Lacrimal sac exposed and dislocated outwards from the fossa.

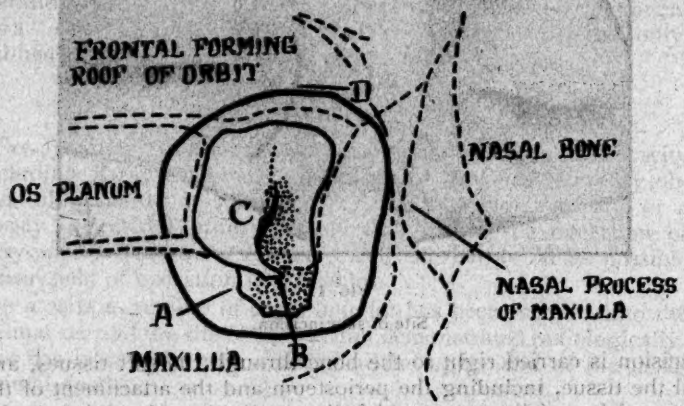

FIG. 3.

Orbital aspect of right lacrimal bone with the adjoining bones indicated by interrupted lines. A—process downwards forming inner wall of nasal duct and joining inferior turbinate. B—hamuler process. C—lacrimal crest. The continuous line D shows the amount of bone removed at operation.
(From "The Anatomy of the Human Skeleton," by J. E. Frazer).

The advantages of the medially placed incision, as opposed to one immediately over the sac, are two. First, it prevents damage to the lacrimal sac in the early stages of the operation, and, secondly, it prevents the formation of a "Mongoloid fold," which may be the sequel of an incision too near the inner canthus. When

the inner wall of the fossa for the lacrimal sac has been thoroughly exposed, and the sac retracted outwards by means of a self-retaining retractor of the mastoid type, sufficient bone is removed from the inner wall of the fossa and its neighbourhood to uncover an area of nasal mucosa of about the size of a sixpence. This is carried out by means of a small mastoid gouge and hammer, and the use of nibbling forceps, as required. It is essential to remove an adequate amount of bone in the neighbourhood of the fossa, in order to facilitate the easy anastomosis of the lacrimal sac to the nasal mucosa. This exposure of the periosteal aspect of the nasal mucosa usually entails removal of the entire lacrimal bone, a portion of the nasal process of the maxilla, and the neighbouring portion of the lamina papyracea of the ethmoid (Fig. 3). In so doing, ethmoidal cells may be opened, but this need not cause anxiety, and any portion of the ethmoidal labyrinth which obstructs easy access to the nasal mucosa may be confidently removed. If a large middle turbinate is encountered which may cause some obstruction to the new anastomotic channel it is wise to postpone its removal until later as otherwise adhesions may form. Identification of the lacrimal sac is not usually difficult, especially when it is distended to form a mucocele, but it is desirable at this stage to pass a probe along the lower canaliculus as a routine measure in order to aid and confirm its identification. This is especially necessary if the sac is fibrous as a result of disease or trauma.

The next step is to carry out an anastomosis of the medial wall of the lacrimal sac with the nasal cavity. This is done by means

FIG. 4.

Nasal mucosa exposed after removal of bone, showing site of incisions to form nasal flaps.

FIG. 5.

Nasal flaps cut. Site of incision for lacrimal flaps shown. The upper end of a probe, which has been introduced into the nostril, is seen between the flaps.

FIG. 6.

Posterior flaps sutured. Anterior flaps ready to be sutured. The end of a probe which has been passed through the lower punctum along the lower canaliculus is seen lying between the lacrimal flaps; and the upper end of the other probe which has been introduced through the nostril is seen lying between the nasal flaps.

of two posterior flaps and two anterior flaps cut from the lacrimal sac and the nasal mucosa, as shown in the accompanying diagrams, (Figs. 4 to 7). In order to ensure that the nasal flaps can be reflected correctly it may be necessary to "square up" the bony margins before inserting the sutures. The suture employed is No. 6/0 ophthalmic catgut, with eyeless needles. The skin wound is closed with interrupted silk sutures. A firm pad and bandage encourage haemostasis, and are retained for twenty-four hours.

After-treatment.—The dressing is changed at the end of twenty-four hours, and re-applied daily for four or five days, after which the stitches are removed and no further dressing is usually needed.

FIG. 7.

Suture of anterior flaps.

It has not been found necessary to carry out post-operative probing, or frequent syringing of the new anastomotic canal, and it is considered that absence of free patency on gentle syringing at the end of five days is an indication that the operation is a failure.

During the first week after the operation, some epiphora may continue, owing to post-operative swelling of the soft tissues, but, in a successful case, it will have ceased at the end of this period, when, as a rule, the patient leaves hospital.

Modified operation, in cases where the lacrimal sac is contracted.—In certain cases, it has been found impossible to make satisfactory flaps from the sac, on account of its small size. The sac may be so fibrotic as to be unidentifiable, or so small as to preclude the cutting of flaps. This does not necessarily mean that a good functional result cannot be obtained. When the probe is passed along the lower canaliculus, as previously indicated, it is gently

but firmly pushed on, so as to appear in the cavity of the wound, a small incision being made with a scalpel if necessary, to assist this manoeuvre. Scarred remains of the inner wall of the sac are then removed. A single anterior flap of nasal mucosa is cut, and sutured to the soft tissues of the outer lip of the incision immediately superficial to the probe. Direct drainage is thus established from the lower canaliculus into the nasal cavity, and a satisfactory outcome may be expected.

The operation of dacryo-cysto-rhinostomy is sometimes carried out by an ophthalmologist, and at other times by a rhinologist; but we feel that the combination of the two, working together, is the most satisfactory arrangement. In most cases, the primary incision and identification of the lacrimal sac are carried out by the ophthalmologist, whereas the removal of the bone and exposure of the nasal mucosa are carried out by the rhinologist, who is more used to this kind of work, and is capable of dealing with any concomitant condition existing in the ethmoidal air cells, which may be encountered in the removal of the bone. The anastomosis is performed by the ophthalmologist.

Case reports

The following 50 patients have undergone dacryo-cysto-rhinostomy under our care in three Royal Air Force Hospitals, (in the U.K., in M.E., and in C.M.F.), during the past five years.

They are classified as follows:—

1. Non traumatic ... ... 26 patients.
2. Traumatic:
   - (*a*) Aircraft crashes ... ... 12 patients.
   - (*b*) Car and motor-cycle accidents ... 3 patients.
   - (*c*) Sequelae of nasal operations ... 3 patients.
   - (*d*) Other trauma ... ... 6 patients.

Six patients had bilateral operation, bringing the total of operations to 56.

Analysis of cases (see Table)

This series of fifty cases, (of which six were bilateral, making a total of fifty-six operations), serves to illustrate some points of aetiology and symptomatology of naso-lacrimal duct obstruction, and the benefits to be anticipated if dacryo-cysto-rhinostomy by this technique is performed.

Prior to operation, all patients complained of continuous, and often copious, epiphora, and chronic recurrent infection of the conjunctival sacs.

TABLE OF CASES. I.—NON-TRAUMATIC CASES

	Name, Rank and Age	History	Date of Operation	Result	Follow-up
1	AC.2 L. V. H., 32 years	Left epiphora 22 years. Regurgitation from L. sac	Aug. 5, 1940	No epiphora; passage clear	Two attacks of conjunctivitis associated with "Cold in the head" during the last 4 years, but no watering since the operation
2	AC. W. R., 18 years	Acute dacryocystitis June, 1941. Epiphora persists	Aug. 18, 1941	ditto	—
3	AC.W. M. G. D., 37 years	Left epiphora for indefinite period. Regurgitation from left sac	March 5, 1942	ditto	—
4	L.AC. J. T., 22 years	R. epiphora—4 years. No history of trauma. Probed 4 times without cure	June 8, 1942	ditto	—
5	Sister P., 30 years...	Prolonged R. epiphora. *R. dacryocysto-rhinostomy on two previous occasions*	July 1, 1942	ditto	—
6	AC. R. G. D., 20 years	Bilateral lacrimal sac fistulae since infancy, with continuous epiphora	Aug. 15, 1942 (R.) Aug. 25, 1942 (L.)	No epiphora; passages clear	*25-11-44:* "No watering or other ocular discomfort"
7	L.AC. A. B., 22 years	Prolonged L. epiphora. Probed without cure. Regurgitation from left sac	Sept. 9, 1942	No epiphora; passage clear	—
8	AC. R. G., 33 years	Prolonged R. epiphora and regurgitation from right sac	Oct. 7, 1942	ditto	*26-11-44:* "Not a moment's trouble since operation"
9	AC. J. H., 41 years	R. epiphora—1 year. Mucocele of lacrimal sac which can be evacuated into the nose by digital pressure	Nov. 2, 1942	ditto	—
10	AC. H. R., 35 years	Watering of both eyes, L. more than R. —4 years. Regurgitation from L. sac	Jan. 9. 1943 (L.) Feb. 8, 1943 (R.)	No epiphora; passages clear	Serving overseas
11	Sgt. J. B., 32 years	R. epiphora—2 years. R. duct probed twice. Regurgitation from right sac	Jan. 28, 1943	No epiphora; passage clear	*28-11-44:* "Operation a complete success"
12	AC. S. F. D., 31 years	R. lacrimal abscess—1928. Frequent recurrences since, and continuous R. epiphora. Regurgitation from R. sac	Feb. 20, 1943	ditto	*1-12-44:* "Occasional watering of eye in a cold wind"

TABLE OF CASES. I.—NON-TRAUMATIC CASES—*continued*

Name, Rank and Age	History	Date of Operation	Result	Follow-up
13 L.AC. A. L. P., 26 years	L. epiphora—8 months. L. lower canaliculus occluded, though upper is patent	Feb. 22, 1943	Epiphora persists. Passage clear through upper canaliculus	*6-7-43—22-7-43:* Passage clear through upper canaliculus. Epiphora relieved by excision of palpebral portion of lacrimal gland
14 L.AC. J. R. D., 22 years	R. epiphora—15 years. Regurgitation from R. sac. *"Excision" of R. sac 1942*	June 14, 1943	No epiphora; passage clear	*June, 1944:* Condition satisfactory. No watering
15 L.AC. R. R., 25 years	Bilateral epiphora and ocular discharge —1 year. *"Excision" of R. sac on 2 occasions, and of L. sac on 3 occasions*	June 8, 1943 (R.) June 22, 1943 (L.)	No epiphora; passages clear	*Dec. 1944:* Condition satisfactory. No epiphora since operation
16 AC. F. F. C., 42 years	R. epiphora—18 months. R. duct probed in July, 1943	July 24, 1943	No epiphora; passage clear	—
17 AC. V. R., 23 years	Bilateral epiphora—3 years. Both ducts probed on three occasion, and *bilateral dacryo-cysto-rhinostomy performed*	Sept. 29, 1943 (L.) Oct. 13, 1943 (R.)	No R. epiphora. Slight L. epiphora. Passages clear	*27-11-44:* Right eye satisfactory, but left continues "to water" slightly
18 L.AC. P. W. P., 25 years	*R. lacrimal sac "excised" in August, 1942* for epiphora. This persists	Oct. 2, 1943	Slight epiphora remains. Passage clear	—
19 L.AC. F., 22 years	*"Excision" of L. sac for mucocele in 1943.* Left epiphora continues	March 1, 1944	No epiphora; passage clear	Passage subsequently contracted. Probing was ineffectual. Excision of half of lacrymal gland
20 AC. H. E. G., 42 years	Persistent right epiphora—6 months	March 17, 1944	ditto	—
21 AC. P., 30 years ...	L. epiphora—6 months, and regurgitation from L. sac	March 21, 1944	ditto	*27-11-44:* "Entirely satisfactory in every way"
22 AC.W. D. A. S., 20 years	R. epiphora—3 months	June 10, 1944	ditto	—
23 AC. T. S., 35 years	L. epiphora—3 years. Chronic left ethmoiditis	June 12, 1944 (external ethmoidectomy at same time)	ditto	—

TABLE OF CASES. I.—NON-TRAUMATIC CASES—*continued*

Name, Rank and Age	History	Date of Operation	Result	Follow-up
24 L.AC.W. A. C. F., 24 years	L. epiphora—4 years. Regurgitation from L. sac, 2 years. *L. dacryo-cysto-rhinostomy on two previous occasions*	Sept. 15, 1944	No epiphora; passage clear	—
25 L.AC. C. D. S., 21 years	R. epiphora throughout life. Probed without improvement	Sept. 28, 1944, Ant. flap only	ditto	*1-12-44:* Satisfactory; no watering
26 L.AC. W., 22 years	L. acute dacryocystitis—1935. Epiphora and regurgitation since that time	Nov. 15, 1944	ditto	*10-8-45:* Entirely satisfactory. No watering
	II.—TRAUMATIC CASES (i) *Aircraft Crashes*			
27 L.AC. B. K., 25 years	Aircraft crash Dec. 9, 1940. Watering and discharge from R. eye since that date	March 15, 1941	ditto	*Nov. 1941:* (Serving overseas)
28 Sgt. D. W., 22 years	L. lacrimal fistula following injury in aircraft crash in January, 1941	April 4, 1941	ditto	*Nov. 1941:* Slight epiphora in cold wind
29 L.AC. C. W. A., 27 years	Injury to face by control column in a forced landing. Persistent R. epiphora since that time. Probed without cure	Sept. 19, 1941 (fracture seen at operation)	ditto	—
30 Sgt. F. A., 22 years	A/c. crash June 9, 1940. Watering of L. eye since that date	Oct. 4, 1941 (fracture seen at operation)	ditto	—
31 A.L.A. J. H. ...	A/c. crash June 3, 1941. Watering of R. eye since that date, with regurgitation from right sac	Dec. 1, 1941	ditto	—
32 Sgt. V. S., 28 years	A/c. crash July 14, 1941. Watering of L. eye since that date, with regurgitation from left sac	Jan. 9, 1942	ditto	—
33 F.O. A., 23 years ...	A/c. crash Sept. 23, 1941. Watering of L. eye since that date, with regurgitation from L. sac	Feb. 13, 1942	ditto	—

TABLE OF CASES. II.—TRAUMATIC CASES (i) *Aircraft Crashes—continued*

	Name, Rank and Age	History	Date of Operation	Result	Follow-up
34	L.AC. A. H. H., 28 years	A/c. crash August 13, 1942. Watering of R. eye since that date, with regurgitation from right sac	Feb. 24, 1943	No epiphora; passage clear	—
35	Sgt. R. W., 20 years	A/c. crash August 18, 1942. Watering of R. eye since that date. Right duct probed April 1, 1943	April 17, 1943	ditto	—
36	W.O. H. K., 25 years	A/c. crash in Feb., 1944. Watering of L. eye since that date	Sept. 15, 1944	ditto	—
37	F.S. C., 21 years ...	A/c. crash August 13, 1944. Watering of R. eye since that date. One attack of acute dacryocystitis	Nov. 6, 1944. Partial myectomy of R. Inf. Oblique Muscle through same incision	ditto	—
38	F.Lt. R. P. de C., 24 years	A/c. crash, March 1943. Watering of R. eye since that date. *"Excision of R. sac in Dec. 1943 and again in August, 1944*	June 12, 1945	ditto	—
		II. TRAUMATIC CASES—(ii) *Car and Motor-cycle Accidents*			
39	Sgt. D. D., 32 years	Car accident, June 24, 1941. Watering of R. eye since that date	Sept. 24, 1941	ditto	*8-11-41:* Satisfactory. No watering
40	Sgt. W. H., 24 years	Car accident, May 6, 1942. Watering of both eyes since that date. *Has had bilateral dacryo-cysto-rhinostomy*, but watering persists, with regurgitation from both sacs	April 3, 1943 (R.) April 27, 1943 (L.)	No epiphora; passages clear	—
41	L.AC. G. A. R., 28 years	Motor-cycle accident, Dec., 1940. Watering of L. eye since that date, with regurgitation from left sac	May 21, 1942	No epiphora; passage clear	—

II. TRAUMATIC CASES—(iii) *Sequelae of Nasal Operations*

II. TRAUMATIC CASES—(iii) *Sequelae of Nasal Operations*

Name, Rank and Age	History	Date of Operation	Result	Follow-up
42 AC. J. G., 30 years	Nasal operation in 1926. Watering of L. eye since that time. Has been probed, and had "*Excision*" *of the L. lacrimal sac*	June 30, 1941	No epiphora; passage clear	*19-9-41:* Slight recurrence of epiphora. Syringed with satisfactory result
43 P.O. R. B. S., 24 years	Left Caldwell Luc Operation, 1942. Left epiphora from that time, and regurgitation from left sac	Jan. 26, 1944	ditto	—
44 Sgt. K. G. M., 27 years	Bilateral Caldwell Luc Operation in 1935. Watering of both eyes since that time	Oct. 16, 1944 (L.) Oct. 27, 1944 (R.)	No epiphora; passages clear	*3-3-45:* Satisfactory. No watering

II. TRAUMATIC CASES—(iv) *Other Trauma*

45 AC. D. D. B. H., 24 years	Accident of unspecified type to head in 1925. Left epiphora since that time. Acute dacryocystitis in Feb., 1941	March 10, 1941	No epiphora; passage clear	—
46 W.O. R. L., 41 years	Injury to L. side of face in childhood, and resulting L. epiphora. *L. sac "excised" in 1940*	Sept. 18, 1941 (external ethmoidectomy at same operation	ditto	—
47 AC. E. B., 26 years	Left Inferior canaliculotomy in 1917, with resulting epiphora, which has continued	June 22, 1942	ditto	—
48 L.AC. S. P., 25 years	Accident to L. side of face in 1934. Watering of L. eye since that time, with regurgitation from L. sac	August 12, 1942	ditto	*2-12-44:* Successful. No symptoms
49 L.AC. V. S., 21 years	Facial injuries, August 30, 1940. Watering of L. eye since that time. Left acute dacryocystitis in Feb., 1941, and *left sac was subsequently "excised."* Recent recurrence of regurgitation from left sac	April 28, 1943	ditto	—
50 L.AC. A. G. L. ...	Injury to L. eye in Oct., 1942. Watering of L. eye, and regurgitation from left sac since that time. "*Excision*" *of L. sac in Nov., 1942, repeated in June, 1943*	Sept. 6 1944	ditto	*30-11-44:* (Serving Overseas)

The non-traumatic cases comprised 26 patients, and involved 30 operations. The aetiology of these cases is a matter for surmise. In three of them, all unilateral cases, there was a history of onset of symptoms with an acute attack of dacryocystitis; but it is agreed that acute inflammation around the lacrimal sac is a result, and not a cause, of obstruction of the naso-lacrimal duct, and some constriction was probably present before the attack of acute inflammation occurred.

Few of the patients showed any abnormality of the nasal cavity. This fact agrees with what one would expect, since the obstruction usually occurs at the junction of the sac and the naso-lacrimal duct.

Two of the cases had accompanying ethmoiditis, and twelve exhibited a mucocele of the lacrimal sac. It is possible that a chronic inflammation of the lacrimal sac induces the constriction of the duct.

A satisfactory result was obtained in a case in which the nose was filled with nasal polypi. A combined external ethmoidectomy and dacryo-cysto-rhinostomy was performed. This necessitated sacrificing the posterior nasal flap, the posterior lacrimal flap being sutured to the orbital periosteum. A month after the operation the patient's nose was clean, free of polypi and discharge and the epiphora had disappeared.

The traumatic cases numbered twenty-four, two of which were bilateral, and the total operations numbered twenty-six.

In eleven cases of this group, there was a mucocele of the lacrimal sac, and in three, a history of acute dacryocystitis. In this series, the non-traumatic and traumatic cases show almost equal incidence, but, in view of the increased liability to injury of certain members of the Royal Air Force in time of war, it is probable that, under peace-time conditions, the traumatic cases would be in a minority.

Ten of the total series of operations were performed after one or more attempts at excision of the lacrimal sac, and six after attempts at an anastomotic operation, had been made elsewhere.

Fifty-three of the fifty-six operations under review were completely successful, and the patients concerned were discharged from hospital symptom-less, and with free passage from the inferior punctum to the nose; while three, including one case where there was obstruction of the inferior canaliculus with a patent superior canaliculus, showed varying amounts of epiphora.

An attempted follow-up of these 56 operation cases, for periods up to four years after discharge of the patient from hospital, was successful only in 23 instances, some of the personnel being inaccessible owing to overseas service, others having been released from the Service for reasons unrelated to their eyes, and a few having been killed on active service.

In eighteen of the twenty-three operation cases followed up,

a report was received stating that there was complete freedom from ocular symptoms, and great satisfaction was expressed upon the result of the operation.

Mild epiphora in cold wind, but not amounting to a serious disability, was reported in three cases; and, of these, only one was a case of straightforward, primary traumatic lesion—one being a case in which previous dacryocystectomy had been performed, and one a case in which there had been an attempted dacryo-cysto-rhinostomy previously.

One case, in which the lacrimal sac had previously been totally excised, showed recurrence of symptoms within one month of operation. No sac remnant had been found, and an effort had been made to suture the canaliculi into the nasal mucous membrane. Syringing and probing did not remedy the condition, but relief was attained after excision of the palpebral portion of the lacrimal gland.

One case showed no improvement of symptoms because the inferior canaliculus was obstructed. The operation, however, was technically successful, because the passage was patent when syringed through the upper punctum. Relief also followed excision of the palpebral portion of the lacrimal gland.

It is demonstrated, therefore, that of the cases followed up, eighteen of the operations performed (78 per cent.), resulted in complete freedom from symptoms; three, (13 per cent.), resulted in much improvement, and in two instances, (9 per cent.), there was no improvement.

It should be emphasized that, of the five cases in which full success was not attained, only one was quite straightforward.

Loss of patency of the inferior canaliculus should be regarded as a contra-indication to this method of treatment.

In thirty of the cases, the patients concerned were not traced by follow-up, but they were all symptom-free, with clear drainage, when discharged from hospital, and it is reasonable to suppose that no serious recurrence of epiphora was reported, or the case would have been referred back to us.

On two occasions, the operation was combined with external ethmoidectomy, and, on one occasion, with partial myectomy of the inferior oblique muscle, with satisfactory results.

Comments

Epiphora which exists over a long period is a severe disability. It causes an eczematous condition of the skin of the inner end of the lower lid. Dermal fibrosis and contracture follow, with resulting ectropion and constriction of the inferior punctum. These are additional causes of epiphora, and it is desirable, therefore, that steps should be undertaken to cure the condition as soon as possible, if the best results are to be obtained.

The operation of dacryo-cysto-rhinostomy is the treatment of choice. It retains the hydrostatic principles of lacrimal drainage, and the complete cure which follows its immediate performance in cases of traumatic obstruction of the naso-lacrimal duct, proves its value.

The operation of dacryo-cystectomy, so frequently employed in the treatment of mucocele of the lacrimal sac, is, in our experience, sometimes incompletely performed. The retained mucous membrane appears to continue the secretion of mucus, which, not being absorbed, becomes surrounded by a fibrous tissue capsule, the inner surface of which is lined by columnar epithelium. This "pseudo lacrimal sac" is usually in continuity with the inferior canaliculus, and may be employed instead of the normal sac in the operation of dacryo-cysto-rhinostomy.

Sometimes the "pseudo lacrimal sac" contracts when its contents are drained, and some constriction of the passage may result. A patent inferior canaliculus is an essential part of lacrimal drainage, the upper canaliculus appearing to play no part in this function. Obstruction of the lower canaliculus, therefore, contra-indicates the anastomosis operation. Previous attempted drainage of the lacrimal sac into the nose does not prejudice the results of dacryo-cysto-rhinostomy by the method herein described, and a more satisfactory result is obtained from a reformation of the anastomosis than from excision of the sac.

We have had no experience of the treatment of naso-lacrimal obstruction in children, except by probing in infantile cases, and we are not able to assess the place held by dacryo-cysto-rhinostomy in its treatment, but we wish to place on record our experience of its success in adult cases, where the only contra-indications are :—

(*a*) Previous *complete* excision of the lacrimal sac. (N.B. This can usually be determined only at operation.)

(*b*) Destruction of the inferior canaliculus.

(*c*) Obstruction of the naso-lacrimal duct, due to tuberculosis, or malignant neoplasm, and, in most cases,

(*d*) Atrophic rhinitis.

Summary

1. A description is given of a technique employed in the operation of dacryo-cysto-rhinostomy.

2. Records are reproduced of 56 instances in which the operation has been performed.

3. The cases are analysed to show the satisfactory results obtained by this procedure, even in cases in which previous surgical intervention has been carried out.

4. The aetiology and symptomatology of naso-lacrimal obstruction are discussed.

We wish to thank the officers commanding P.M.R.A.F. Hospital Halton, No. 1 R.A.F. Hospital C.M.F., and No. 5 R.A.F. Hospital M.E.F., (Group Captains Barnes, Nicholls and Rear, respectively), and the Director General of Medical Services, Air Marshal Sir Harold Whittingham, for their kind permission to publish this article.

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ANNOTATIONS

Undergraduate Teaching of Ophthalmology

The curriculum of the medical student is again under critical examination by those interested in undergraduate teaching. Justifiable uneasiness is felt at the vast increasing amount of facts that the student is being called upon to remember often at the expense of making him a well educated man, able to think, deduce, sift, comment, criticise and arrive at a sensible conclusion about matters in and related to his professional work. The trend of the excessive forcing of facts into his mind during the short period of his training is to make the majority parrot-like, inadequately equipped for independent thought and judgment.

In hospital practice he sees among the in-patients a number of rare diseases which he may not meet again. Beds are occupied for long periods by patients suffering from obscure anaemias of academic interest only, and other rare disorders and of little value in preparing the general practitioner for his life's work. Probably in the out-patient department he sees more of the types of case he will have to treat in practice. This is so of the commoner eye diseases. In most teaching hospitals he attends the eye department once a week for three months, about twelve possible attendances in all of which two may be spent on holiday, and a third or fourth at either a football or cricket match.

In large medical schools the size of the class may be between 20

and 30 students. A manageable number for clinical demonstrations with proper consideration for the patients is 6 to 8. What should the future G.P. be taught of ophthalmology in such a limited time?

We think that ophthalmology should be presented to him not as a special subject, but rather as a part of general medicine in which disease processes like those elsewhere in the body produce manifestations peculiar to a special sense organ. By clinical demonstrations stress may be laid on the ocular signs in disease of the cardio-vascular, nervous and renal systems, on the association of certain diseases of the eye with skin disorders, diabetes and deficiency diseases.

The student should be trained in the treatment of common inflammatory disorders of the eye which he will meet in general practice such as hordeola, conjunctivitis and conjunctival foreign bodies. He must appreciate the significance of ocular headaches due to refractive errors and be trained to recognise glaucoma, cataract, retinal detachment and papilloedema. He need waste no time watching eye operations, for by means of coloured films he could be presented in the course of half-an-hour with the main features of the commoner eye operations.

Doors and Door Plates

We have often wondered whether the colour of the front door of a professional house has any psychological effect on prospective patients. Of course if a man is lucky enough to have a front door to his house of oak or mahogany he need not worry about anything save occasional polishing and not much of that. We suppose that those who have painted doors choose the colour that they like best. Physicians seem to like the deeper shades of blue. Black is sombre and depressing while white so soon gets dirty and loses its smart effect. Can a surgeon have a blood red door with propriety or will it have alarming effects on the minds of his clients? All things considered we have come to the conclusion that green is the best colour for an ophthalmic surgeon. It is said to be comforting to the sight and the patient may feel assured that he will find the green on the door and not in the surgeon's eye.

The door plate is an important item in the proprietor's outfit. At one time, before numbering of houses was obligatory, nearly all London houses had door plates and until recently we believe that that of the Earl of Powis could still be seen in Berkeley Square. Nowadays the door plate is mainly confined to professional men such as doctors, dentists and lawyers, and to certain branches of trade. In the consulting area it is sufficient to have one's name and title on the plate. A parade of qualifications would be out of place.

But in less exalted districts it is quite usual to find the words "Physician and Surgeon" under the name, just as Mr. Pecksniff's front door at Salisbury was ornamented with "Pecksniff, Architect" on the plate. There is something to be said for the exhibition of qualifications in rural areas; the bucolic mind will almost certainly be more impressed by the letters M.R.C.S., L.R.C.P., than by M.D. Indeed it might even construe the latter to mean Money Down, and be scared in consequence.

When the writer was young the door plate was generally of medium size and made of brass. A well polished plate with the name almost illegible was a sign that the owner was in extensive practice. At present the size seems to be diminishing and stainless metals are preferred in view of the inadequacy of domestic assistance. A medical man's wife will be quite up to laying and lighting the fire, but she will draw the line at having to clean the front door step and polish the plate, and we do not blame her. The plate may be on the door panel or on the side posts, or the proprietor's name may even take the place of "Letters" on the flap of the letter box. In passing it is probably wise for the ophthalmic surgeon's plate to be on the large size rather than the small. As many of his patients may be affected by failing vision he should not add to their difficulties by having a tiny plate in a more or less inaccessible position. It is always a pathetic sight to meet an old lady with defective sight groping down the "long unlovely street" consulting every door plate on each house. And in these days when we are informed that there is no limit to the number of plates on any door, she might spend a day almost before she got to the end of her search.

The great John Hunter used his name on the plate without his title of "Mr." and stoutly refused to change his habits.

The door plate should be, and generally is an ornamental addition to the door; but the plates that are attached to the area railings to notify one's change of address are of cheap material, usually indifferently painted and far from ornamental. This need not worry the doctor who has moved elsewhere, but it is rather an eyesore to the house and those that remain.

So far as we know there are no collections of medical door plates in existence at the British Museum or anywhere else. Yet the plates of say Lord Lister from Edinburgh, Glasgow and London would be of interest and of some historical value.

What happens to the old door plates? Are they sold for scrap metal or worked up anew for someone else?

When once a professional man has retired from practice he can discard his door plate and feel assured that he will never need another such appendage till the time comes when he can cease from worrying about anything. A story used to be told of a parsimonious doctor who instructed his executor to have his door plate affixed to

his coffin to save expense, but we believe that this story is wholly apocryphal.

The subject is not without its fascination for a certain type of mind. But we could not honestly advise any budding aspirant for the M.D. degree to choose it for the subject of his thesis. We doubt whether the Regius Professor would approve of it.

ABSTRACTS

I.—MISCELLANEOUS

(1) **Hardy, Le Grand H., Chace, Robert H. and Wheeler, Maynard C. (New York).—Ophthalmic prisms, corrective and metric.** *Amer. Arch. Ophthal.*, Vol. XXXIII, p. 381, 1945.

(1) The measurements of prisms has in the past, been somewhat unsatisfactory, but the prism dioptre has now been adopted almost universally as the unit. Even the prism dioptre is not as simple as it sounds, however, because an unusual condition must be introduced into the system of measurement—namely, that all the refraction effect must take place at one surface; in other words, that the incident light must be normal to the surface of the prism when measurement of its displacement is made. **Hardy, Chace** and **Wheeler** have devised an instrument for making these measurements, and, by using it on twenty assorted sets of prisms, have found that many of them have errors exceeding reasonable manufacturing standards. These are not significant in prisms of low power, but in those of high power—such as are used in the cover test method of estimating the deviation in strabismus—the errors are of considerable importance.

F. A. W-N.

(2) **Long, John C. and Danielson, Ralph W. (Denver).—Cataract and other congenital defects in infants following rubella in the mother.** *Amer. Arch. Ophthal.*, Vol. XXXIV, p. 24, 1945.

(2) This association was first noted in 1941 by Gregg, following a severe Australian epidemic of German measles. He described seventy-eight cases of congenital cataract, twenty examined personally, and the remainder reported by colleagues. In 68 there was a history of rubella in the pregnant mother. A later investigation by a research team found that, of sixty-one mothers who contracted rubella during pregnancy, forty-one bore children with congenital defects, the most important being fifteen cases of cataract, twelve of deaf-mutism, twenty-one of cardiac abnormalities, and at least fifteen of some degree of microcephaly. There appears to be some correlation between the type of defect and the stage of

pregnancy at which rubella is contracted. The average duration of pregnancy in the cataract cases was 1 - 4 months, and in the deaf-mutes, 2 - 3. If rubella is contracted within the first two months of pregnancy, the mother is almost certain to give birth to a congenitally defective child; if in the third month, the chance is about 50%. These and other points seemed, to **Long** and **Danielson**, to point out the necessity for further examination, and they give details of six cases personally observed in which rubella had developed in the mothers in the first two to six weeks of pregnancy, the disease being of mild character. All the babies had congenital cataract, three being bilateral; the unilateral ones were primarily nuclear, with a less opaque periphery. Some type of cardiac lesion was present in all six, and the infants were smaller than average. In an endeavour to answer the question why the relationship between maternal rubella and defects in the offspring had not been noted prior to 1941, it is suggested that the rubella virus has become altered in some way. Possibly this was brought about by crowding and troop movements, facilitating the rapid transfer of the virus from one person to another. Various suggestions have been made for treatment—deliberate exposure of girls to rubella to immunise them to infection before the child-bearing age; the use of convalescent serum for all women in early pregnancy who have not had rubella, and finally, therapeutic abortion if rubella should occur during the first three months of pregnancy.

F. A. W-N.

(3) **Stocker, Frederick W. (Durham, N.C.). — Response of chronic simple glaucoma to treatment with cyclodiathermy puncture.** *Amer. Arch. of Ophthal.*, Vol. XXXIV, No. 3, p. 181, September, 1945.

(3) **Stocker** has used this method of treating glaucoma in well over 100 cases. At first he limited it to desperate ones, where other operations had failed; but later he applied it to chronic simple glaucoma. The latter were mainly negroes, the reason being that, in this race, the beneficial effect of a filtering operation was more likely to be nullified by cicatrization than in white persons.

The reason why diathermy puncture reduces ocular tension is uncertain, but a section of the eye, in which the operation had been performed with a successful result lasting over two years, showed complete atrophy of the ciliary processes over the treated area, with normal ciliary processes over other areas. The author suggests that this is brought about by destruction of the long posterior ciliary arteries in their passage through the pars plana—the portion of the ciliary body into which punctures are made. The present paper deals with 16 eyes affected with chronic simple glaucoma, observed over periods 1—10 months.

In no case has the tension after operation been higher than before, and in 15 it was definitely lowered within the first few days. The tension later was normal in 14 cases. In a group of 8 patients with very advanced glaucoma, central vision improved in 2, became worse in 1, and remained the same in 5. In no case did the field deteriorate, and in 2 it improved. In less advanced cases, somewhat similar results were obtained. Immediate post-operative complications are negligible, and late disturbances are even more conspicuous by their absence. Cataract, which is the complication one would expect after partial destruction of the ciliary body, did not develop, and even pre-existing senile opacities progressed no further than expected after the operation. The author therefore feels justified in saying that no side or after effects could be observed which would make this operation unsuitable for chronic simple glaucoma.

In performing it, the object is to damage the eye as little as possible, while producing permanent stabilisation of the intra-ocular pressure within normal figures. A very fine needle, 0·5 mm. long and 0·18 mm. in diameter, is used, and a current just sufficient to produce coagulation on touching the sclera—usually 15-20 milliamperes. The needle should be left in the sclera a little longer than one second, and be under current throughout the procedure. Usually rather more than one third of the inferior circumference is treated over an area beginning 2·5-3 mm. from the limbus, and extending back to the ora—*i.e.*, 8 mm. from the limbus. The number of punctures is governed by the intra-ocular pressure being equal to the amount of this in mm. Hg + 30 with a maximum of 80.

F. A. W-N.

II.—MEDICAL OPHTHALMOLOGY

Rudolph, C. J. (M.C.) A.U.S.—Eye findings in rheumatic fever.
Amer. Jl. Ophthal., Vol. XXVIII, p. 319, 1945.

(1) Rudolph chose at random 105 cases of rheumatic fever out of 650. In 94 of these he found the eyes normal; in 9 there was injection of deep conjunctival vessels; and the blood was dark in the veins of 2 cases. Vision was unimpaired in all cases and the visual fields were full. In 20 per cent. there was accommodation fatigue which, as the author comments, may occur in any debilitating illness.

He concludes that there is no ocular pathological change associated with rheumatic fever.

H. B. STALLARD

BOOK NOTICE

Ophthalmia Neonatorum. By Professor ARNOLD SORSBY. Published for the Institute of Ophthalmology by Hamish Hamilton Medical Books.

This monograph is the first to be issued under the auspices of the Institute of Ophthalmology, and constitutes a notable addition to the literature on the subject with which it deals. The author is a well-known authority on ophthalmia neonatorum, and much of what he relates is from his own experience. As Sir Allen Daley states in a foreword, the author "writes from very long and personal experience of the treatment of this condition . . ." and "this monograph brings up-to-date all the available knowledge, statistical and clinical, and contains an important section on prophylaxis."

Points brought out by statistical investigation are that, although there has been a gratifying decline in the incidence of impaired vision and blindness from ophthalmia neonatorum, there is no valid reason for believing that the incidence of the disease itself has declined to any marked extent. This is due to various causes, such as ineffective ante-natal treatment of the mother, and the failure to recognise the composite aetiology of the disease—the gonococcus being responsible for only 25 per cent. of cases, while at least 10 per cent. are due to virus infection.

In the clinical section, striking evidence is adduced to show the superiority of sulphonamide therapy over the older methods of treatment, and of penicillin therapy over sulphonamides. So much is this the case that the author gives it as his opinion that general sulphonamide therapy is already obsolete as a routine procedure.

Technique is all important in the use of penicillin, and is given in full detail. When this is followed, cure of the disease may be obtained in a matter of hours.

It is hoped that this monograph will have a wide circulation, not only among ophthalmologists, but also among obstetricians and public health authorities.

CORRESPONDENCE

LOCALISATION OF INTRA-OCULAR FOREIGN BODIES

To the Editors of THE BRITISH JOURNAL OF OPHTHALMOLOGY.

DEAR SIRS,—In the November number of your Journal Kraus and Briggs published a localisation method for intra-ocular foreign bodies which, I am afraid, is based on a faulty conception of anatomical facts.

The authors try to trace the eyeball on the X-ray film using a radiopaque indicator, this touching the centre of the cornea in three different positions of the eye on one plate. The three points thus obtained are assumed to lie in the circumference of a circle representing a section of the eyeball. This is not so.

(1) The anterior-posterior axis of the normal eye is longer than the vertical axis owing to the presence of the cornea. A circle described by a point situated centrally on the cornea will therefore be appreciably bigger than the eyeball (see Fig. 1).

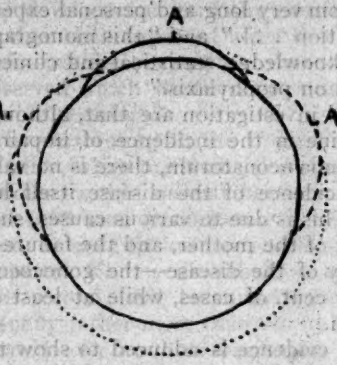

FIG. 1.

Cont. Line: Real size of eye.
Broken Line: Position of cornea looking up and down.
Dotted Line: Apparent size of eye on X-ray film.

FIG. 2.

G: Geometrical Centre.
R: Rotation Centre.

(2) This error will become more pronounced in myopic eyes with a marked elongation of the eyeball (see Fig. 3).

(3) Another inaccuracy lies in the fact that the method gives the rotation centre, not the geometrical centre, of the eye; these points are not identical, the rotation centre lying more than one millimetre behind and slightly nasally from the geometrical centre. The method uses, however, the rotation centre to construct the geometrical shape of the eyeball (see Fig. 2).

(4) Moreover the rotation centre is not a fixed point for all positions of the eyeball; it moves within the space of at least one cubic-millimetre as the position of the eye changes.

It will be seen that the relation of the foreign body to the sclera cannot be found with any accuracy as the circle which is assumed to be a section of the eyeball is in reality an imaginary geometrical construction, a circle with the rotation centre as its centre and its distance from the centre of the cornea at its radius.

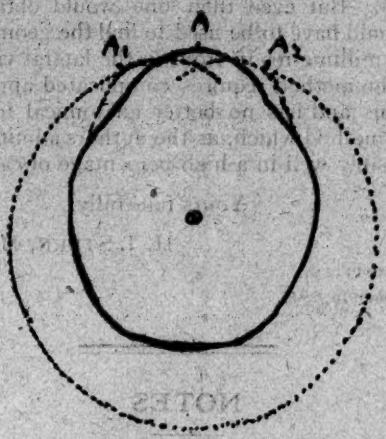

FIG. 3.

Apparent size of eye in myopic eye (dotted line).

The only correct measurement obtained is the distance of the foreign body from the centre of the cornea, and, in the p.-a. view, the meridian. To find these data, it would, however, be much simpler to take one lateral and one p.a. view, while a metallic object, say a lacrymal probe, touches the cocainized cornea.

Finally, in plotting the distance of the incision point in the sclera from the limbus another mistake occurs. The method prescribes to deduct the radius of the cornea from the plotted distance between its centre and the point of the sclera nearer to the foreign body ("P" in Fig. 9, Kraus and Briggs) to get the distance between this point and the limbus. This must inevitably lead to a faulty result; the radius of the cornea must be deducted from the circumference of the segment CP and not from the chord y to get the correct distance (Fig. 9, Kraus and Briggs).

The errors of calculation of this new method are not trivial in spite of being in the region of millimetres or fractions of millimetres. They are big enough to prevent the authors from approaching the goal they have set themselves—to improve on the methods available at present.

Several errors can be avoided by slightly changing the method. So, *e.g.*, the error described under (1) will not occur in the normal eye if the indicator touches the limbus and not the centre of the cornea; this would also obviate the error omitted in plotting the distance between limbus and incision point. (It, would, however, still lead to a wrong result in higher myopia with elongation of the

axis of the eye). But even then one would obtain the rotation centre which would have to be used to find the geometrical centre of the eyeball (1·2 millimetres in front in the lateral view).

In any case the method requires complicated apparatus, cumbersome calculations and has no better anatomical foundations than the simple ring method which, as the authors admit themselves, has "worked reasonably well in a high percentage of cases."

Yours faithfully,

H. J. STERN, Major, R.A.M.C.

No. 43 GENERAL HOSPITAL,
M.E.F. *December 16, 1945.*

NOTES

The Eye-Bank for Sight Restoration Inc. 210, East 64th Street, New York. 21. N.Y.

THE Eye-Bank for Sight Restoration has organized a service for the reception of donor's eyes for corneal transplantation and the distribution of these to surgeons when required. They arrange the call-up of patients awaiting corneal transplants and are able to give these 24 hours notice of the receipt of corneal tissue for grafting. Another purpose of this service is to extend the teaching of the technique of corneal transplantation to more eye surgeons and to establish a fellowship for wider research in the pathology of the eye.

To date more than 50 hospitals in 9 states are co-operating with the Eye Bank to help the improvement of vision in America's estimated 15,000 persons blinded by corneal affections.

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Honours

In the New Year's Honours List, Sir Stewart Duke-Elder has been awarded the K.C.V.O.

Miss Ida Mann has been elected an Honorary Member of the American Ophthalmological Society.

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International Association of Medical Press

THE Association plans in 1946 to issue a bibliographical bulletin of the latest books published in various parts of the world, and requests the editors of such periodicals to bring this enterprise to the attention of their readers so that authors, editors, and typographers may send the Association copies of their publications, or at least all the necessary bibliographical facts.